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Library Classification and Cataloging of Geographic Material[1]

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Books, periodical articles, maps, photographs, clippings and other ephemeral material are geographers' tools; it is the librarian's task to find a place for each, so that geographers may quickly put their hands on any tool wanted. But it is more complicated than arranging carpenters' tools, for we are classifying specific instruments with which the geographer may be unacquainted or of which he may be only vaguely aware, yet which he should be able to find when he needs that sort of tool.

The committee has considered the classification of books, maps, etc., as a device for obtaining the desired order of arrangement on the book shelves, in the map cases, and in vertical or other files; and it has considered also the card catalog as a means of marshalling all of the resources of the library —books, periodical articles, important maps, and even materials in other libraries.

Our objectives should be stated clearly. The classification and physical arrangements of books, maps, etc., should enable the reader to obtain what he wants, so far as feasible, by going direct to the shelves or map collection. And the card catalog should be so organized that the geographical reader may find everything he would wish to obtain, with a minimum of effort and time, by any of the following methods of approach:

[1] Report of a committee submitted to the Council of the Association of American Geographers at its meeting at Syracuse, N. Y., December 30, 1936, and published by direction of the Council. The committee: S. Whittemore Boggs (chairman), Wellington D. Jones, and Lawrence Martin.

By area—all geographical material that is available relating to that area (including all subjects), to permit a selection of the most appropriate material. To be most effective, related areas should be correlated in the files, and not scattered in an alphabetical arrangement.

By subject—all geographical material that is available on a given subject (including all areas or no area), to permit a selection. Related subjects should be effectively related in the files, so as not to require looking alphabetically under various subject headings.

By author—to enable the reader: (1) to find a known work of a given author, and obtain it from the shelves or map case, or (2) to ascertain all that the author has written, or at least all that has been cataloged.

By title (only in respect of significant and unusual titles)—to enable the reader: (1) to find a book, article, or map of known title, and obtain it from the shelves or map case, or (2) to ascertain who wrote a book or article of known title.

It is widely recognized by geographers that literature which is of direct interest to geographers is widely scattered in general libraries. In part this is inevitable, being inherent in the nature of the subject itself; but in large part it appears to be due to the non-geographical approach of most librarians. As a result, geographers find their published material diffused with history, economics, geology, mathematics, and the social sciences. And their only solace is to be found in the fact that non-geographers, looking through the materials in these other fields, unexpectedly make the acquaintance of geographical literature related to the subject of their special interest.

As examples of the dispersion of geographical literature in general libraries, a number of recent publications of members of the Association of American Geographers are listed below; in each instance the Library of Congress classification and its equivalent in words is indicated; and also, where feasible, that of the Dewey decimal system:

Douglas W. Johnson.
Stream sculpture on the Atlantic slope. . . . New York, 1931.
LC GB124 Physical geography—U. S.: special regions.
Dewey 551.40974 Physical and dynamic geology—U. S.: Northeastern or North Atlantic.

Clarence Fielden Jones.
South America. New York, 1930.
LC HC165 Economic history—National production—South America.
Dewey 918 Geography—South America.

Alan Grant Ogilvie, *ed.*
Great Britain; essays in regional geography by twenty-six authors. . . . Cambridge, 1930.

LC DA630 History—Gt. Brit.—Topography, description and travel.
Dewey 914.2 Geography—England (incl. works on Gt. Brit.).

Glenn Thomas Trewartha.
A reconnaissance geography of Japan. Madison, Wis., 1934.
LC GF666 Anthropogeography—Japan.
Dewey 915.2 Geography—Japan.

Wolfgang Louis Gottfried Joerg.
Brief history of polar exploration since the introduction of flying. 2d ed., rev. New York, 1930.
LC G590 Geography—Polar regions—Popular works [587 is "scientific works"].
Dewey 919.8 Geography—Arctic regions.

Ray Hughes Whitbeck.
Industrial geography. . . . New York, 1934.
LC HF1027 Commerce—com. geog.—textbook (elementary).
Dewey 380 Commerce—Communication.

Thomas Griffith Taylor.
Environment and race; a study of the evolution, migration, settlement and status of the races of man. London, 1927.
LC GN320 Anthropology—Ethnology: General works—General special.

Claude Hale Birdseye, *comp.*
Formulas and tables for the construction of polyconic projections. . . . Washington, D. C., 1929.
LC QE75 Geology—U. S. Geological Survey—General publications.
LC GA115 Geography—Cartography—Map projection. Special.

The attention of the committee has been devoted almost exclusively to the problems of the special geographical library, as in university departments of geography. Brief consideration is given, however, to the possible improvement of library practice of general libraries in the classification and cataloging of geographical literature and maps.

I. GEOGRAPHICAL LIBRARIES

CLASSIFICATION OF GEOGRAPHICAL MATERIALS

The classification scheme for geographical libraries should be the most geographical classification that it is feasible to install and use. It is not necessary to consider here so much the intertwining of geographical sub-

jects with those in other fields, as is necessary in a general library which covers the whole field of knowledge.

For example, Economic Geography may here be considered as a branch of geography, not as a branch of economics—although the Library of Congress places Economic Geography under Commerce. Similarly, Map Drawing may be considered in relation to Cartography, rather than to Engineering (the Library of Congress divides it between the two). Again, Terrestrial Magnetism may be classed under Physical Geography and tied in with Geophysics, etc., instead of being classed under General Physics and tied in with Weights and Measures.

The arrangement of all types of geographical material should be considered somewhat as that of a great, unbound geographical encyclopedia; books, periodical articles, maps, and other material logically and conveniently may be arranged as a single body of geographical knowledge, although they must be physically separated, in a manner somewhat analogous to that of oversize books in relation to ordinary volumes.

The most useful arrangement of geographical materials, from the geographer's viewpoint, is believed to be: (1) by area; and (2) by subject. There must also be taken into account (3) author, or occasionally publisher, and (4) date. In the case of books dealing with both area and subject (*e.g.*, "The vegetation and soils of Africa" by Shantz and Marbut), "area" will take precedence over "subject" in a geographical library. Library practice places author ahead of date in the classification of books, and that order should probably be followed in a geographical library (following area and subject); but inasmuch as maps so frequently have no author (unless the publisher is to be regarded as author), it is believed that maps should be filed by notation indicating (1) area, (2) subject, (3) date, and (4) author.

When the treatment in a book or an article is general or theoretical and of general applicability, "subject" precedes "area" (as if, in a numerical notation, the area were "0"). Literature dealing with the world as a whole, arranged by subject, may either be merged with the general or theoretical material, or it may follow it as a separate section. Following this will be the material dealing with smaller areas, arranged in a geographical classification.

The area classification, and the subject classification, should both be as natural and as logical as practicable, and related to accepted classification of cognate material, so that the consultant may approach the catalog and the classified material without the aid of a guide each time he uses them.

The committee is of the opinion that the classification of geographical literature, of maps and atlases, of clippings and ephemeral material, photographs, and any other geographical type of material, should be identical or

parallel, so far as it is feasible to make it so. In other words, the arrangement by areas and the arrangement by subjects should be the same for all types of geographical material. This simplifies the approach, as there is only one system to which the geographer-consultant need become accustomed.

Notation. The notation is a matter of concern to the geographer because the more cumbersome it is, the more frequently he will require the use of a guide to the shelves or the map cases; therefore the shorter and simpler the notation, especially for the main classes, the better the system will be. It should be logical and distinctive, if feasible, making it easy to remember in its larger divisions.

Separate and preferably distinctive notation is necessary for: (1) area, (2) subject, (3) date, and (4) author. The latter two are already provided for in library practice, so that area and subject are all that we need to consider.

The American Geographical Society research catalog uses for area a number, sometimes followed by a letter, for example, "6" for New England, New York, Pennsylvania and New Jersey, "6b" for New England, and "6 > 10" for the United States; for subject a number is used, for example, "3" for Mathematical geography, "311" for Geodesy, and "3115" for Measurements of the length of a meridian.

The Library of Congress uses a combination of letters and numbers, which may signify a subject (without relation to area), or a combination of subject and area. Thus "GA151" indicates "Map reading. General works," and "E41" is the notation for "History. North America—Description and travel."

The Dewey decimal system uses numbers for both subject and area, the latter being a number related to the notation for the history of the same area. The notation "912" stands for "Map or atlas" and "912.773" for "Map or atlas of Illinois"; "572" stands for "Ethnology, anthropology."

In the map collection of the United States Department of State, notation distinguishes clearly between area and subject: numbers are used for area, and letters for subject. Thus "630" is used for "The United States of America," and "640.1" for "The New England states"; "g" is used for "Economic geography" and "gfe" for "Manufactures."

A simple differentiation between area and subject, such as this, is deemed very desirable in the notation system.

CARD CATALOGS

Most libraries, both general and special, maintain dictionary catalogs, in which subjects (including areas), authors, title, and related cross-reference

entries, are arranged in one alphabetical file. A dictionary catalog, of course, fails to bring related geographical subjects together, because they may be far apart alphabetically. For example, "Altitude, Influence of," "Climatology, Medical," and "Tropics—Diseases and hygiene" are widely separated, although definitely related.

The American Geographical Society, however, has developed a *classed geographical card catalog,* which they call the "research catalog," that has proved an invaluable research tool over a period of fourteen years. This classed catalog, inaugurated in 1923, now contains approximately 90,500 cards, representing some 85,600 separate items; the organization of the material is essentially that of a great encyclopedia of geography, in which all pertinent available information is logically arranged, by subjects, and by areas and subjects. The "research catalog" is a card catalog of books, of periodical articles of substantial geographical interest, and of maps that are of particular distinction, because of their subject matter in most instances, whether in books, in periodicals, or in separate form.

It will be recognized that no classed or "research" catalog can bring *all* related materials together (except by means of cross-references or by duplication of cards), but it does bring together the most closely related subjects. The classed catalog offers the added advantage that there is a removal of emphasis upon the wording of a subject, and upon fitting the material in hand into the strict connotation of the wording of a heading that is already provided. Instead, the emphasis is placed upon the *idea,* independent of the wording. In fact, it is independent of language; a French or German classed catalog might utilize the same notation, and therefore follow essentially the same arrangement throughout.

Furthermore, in the classed catalog, subordinate topics are subordinated, and main topics are given important positions, whereas in the dictionary catalog both broad and minute topics stand side by side on apparently equal terms.

There is no question, in the opinion of the committee, that the classed catalog is a highly desirable tool. The form that related parts of the catalog scheme should take, and the manner of their integration, are of primary concern in the preparation of the committee's report.

The catalog system in use at the American Geographical Society embraces the main classed catalog (referred to above), three supplementary card files, and a dictionary catalog, as follows:

(1) The ***main classed or research catalog,*** on 7.5×12.5 cm. cards, in which entries are by area and subject.

(2) A ***subject or topical index file,*** on large cards (5×8 in.), one card for each subject such as 461—"Meteorology" or 5312553—"Yerba maté";

on each card citations are made to each of the areas in the research catalog under which there are one or more entries. Therefore, by turning to each of the areas referred to, one will find all the material on that subject other than the general or non-area literature which is to be found on the smaller cards in the general portion of the research catalog. (This topical index is essentially a file that logically belongs in the research catalog on the smaller cards.)

(3) An *author index file* on 7.5×12.5 cm. cards, one card for each author, giving citations to all of the area numbers under which one will find articles by that author in the main research catalog.

(4) An *alphabetical index of subjects* to be found in the research catalog.

(5) The *dictionary catalog,* which was in use before the research catalog was initiated, and which is maintained much as before, at least so far as books are concerned (although magazine articles and government publications are entered only in the research catalog).

The classification of maps adopted in the United States Department of State in 1931, took into account the various features of the American Geographical Society's catalog, in so far as they seemed applicable to map cataloging at that time.[2] The area classification adopted for the map catalog was as detailed as that of the A. G. S. "research catalog," but the subject classification required for maps was very much simpler. In the two subject classifications there was a close parallelism, which has facilitated the formulation of the classed or research catalog scheme that is recommended below.

The Engineering Societies' library[3] in New York also maintains a classed catalog which, although dealing with a different range of literature, has given us certain ideas; it is simpler in its mechanics than the American Geographical Society catalogs, and it also seems to be working very satisfactorily.

THE CARD CATALOG SCHEME RECOMMENDED

The card catalog system which the committee recommends for geographical libraries is simple, and its practicability has been demonstrated in the experience of three libraries. It is based chiefly upon: (1) the American Geographical Society's research catalog, both in the general plan and in the detailed subject classification (but not in notation); (2) the Department of State map catalog; and (3) the Engineering Societies' classed catalog. The three units of the catalog described below are strictly analogous to those of the classed catalog in the Engineering Societies' library.

[2] A "manual" was prepared in 1932 by S. W. Boggs, geographer, and Dorothy C. Lewis, map librarian, Department of State, entitled "Classification and cataloging of maps and atlases"; it was mimeographed, 159 pages, and the supply has been exhausted; the manual has not been published.

[3] Only a brief study of the Engineering Societies' classed catalog was made, by Mrs. Lewis, map librarian in the Department of State.

For the classed or research catalog it is essential to have a comprehensive classification of areas, and another of subjects, and a satisfactory notation for each.

The subject classification that is recommended will be found in Appendix I, page 68. This is the subject classification that has been developed in the American Geographical Society's "research catalog," but with a few minor modifications. The notation, however, is adapted from the subject notation in use in the Department of State map catalog.[4]

The area classification that is suggested is given in Appendix II, page 84. This is the classification and notation used in the U. S. Department of State map collection.[5]

Provision needs to be made for non-geographical works which may be required in any special geographical library, such as encyclopedias, dictionaries, and general reference works, and books in all of the fields to which geography is related. At the American Geographical Society the general reference works are provided for in the dictionary catalog in accordance with common library practice, and do not appear in the research catalog at all.

It has already been remarked that the card catalog and the classification of the books on the shelves should supplement one another. The cards in the main classed catalog, however, will follow the same arrangement by areas and subjects as that which will be used on the book shelves—that is, if the geographical library adopts for its books, maps, etc., the geographical classed order which is herein described.[6] The supplementary results are to

[4] There are a few minor anomalies in both the classification and notation, which have their origin in the gradual development of the two, in the American Geographical Society and the U. S. Department of State. But since both have proved their practicability it has not seemed advisable to reorganize either the classification or the notation appreciably.

[5] The area classification may, of course, be indefinitely expanded, the three-digit notation being maintained, and decimals being inserted wherever necessary. An expanded area classification is in use in the Department of State, but it has not seemed appropriate to include it in the appendix to this committee report.

[6] The catalog which is described below, however, does not undertake to provide details for cataloging the *publications* in a geographical library by area and subject; any competent librarian will readily *supplement* the system which is described herein, by supplying the apparatus essential as regards inventory (shelf list), tracings to secondary entries, etc. While it is suggested that books, maps, and other materials in the geographical library be classified according to the area-subject classifications provided in the two appendices, the classed catalog herein recommended may be adopted in a geographical library in which the classification and shelf order of the publications follows the Dewey, the Library of Congress, or any other classification. The present report describes only the card catalog which serves as a systematic guide to selected pertinent material in books, periodicals, maps, etc. (some of which may not even be in the library to which it is presumably related); as we already

be obtained by maintaining the important properties of the dictionary catalog in the manner indicated below.[7]

The card catalog recommended by the committee comprises three main units, all on 7.5 × 12.5 cm. cards:

(1) *A classed or research catalog,* resembling very closely the catalog now in use at the American Geographical Society, but with a different notation and certain other modifications. The recommended classed catalog consists of two parts:

(A) the *subject* portion of the catalog (including a limited number of subject-area entries);

(B) the *area-subject* portion of the catalog.

The form and content of the card entries, the range of material (books, periodical articles, maps in books and atlases, separate maps, etc.), and the filing order (determined by the notation in the upper corners of the cards) are illustrated in the examples given below.

	ac
	Colby, Charles Carlyle, 1884– Changing currents of geographic thought in America.
kps A41	*In* Annals A.A.G., 26 (Mar. 1936), 1–37.
	Presidential address delivered before the Association of American Geographers, St. Louis, Mo., December, 1935.

Example 1. A "subject card"—the subject being treated from a general or theoretical viewpoint.

	ac
	Mill, Hugh Robert, 1861– ed.
ac M43	The international geography. By seventy authors. With 489 illustrations. Ed. by Hugh Robert Mill . . . New York and London, D. Appleton and company, 1920. . . .
	[LC printed card 22–4144]

Example 2. A "subject card"—the entire world being systematically treated by areas; an illustration of the suppression of the notation *100* indicating the world as an area.

	df
	Braun-Blanquet, Josias, 1884–
df B63	Plant sociology; the study of plant communities. Authorized English translation of "Pflanzensoziologie" . . . New York, McGraw Hill Book Co., 1932.
	[LC printed card 32–30670]

Example 3. A "subject card."

explained, this catalog is designed as a research tool for geographers and other specialists.

[7] See "(2) An alphabetical catalog of authors (and certain titles)," p. 61 and "(3) An alphabetical index of areas and subjects," p. 62.

		df
200	500	
210		
250		
260	600	

Example 4. This is an illustration of a "subject-area-reference card." It constitutes a series of *cross-references* to the *area-subject* portion of the catalog, and indicates that one or more entries relating to the subject *df* (Plant geography) will be found under each of the areas indicated by the numbers—200 (Europe), 210 (British Isles), etc.

	df–500
	Shantz, Homer Le Roy, 1876–
500df	. . . The vegetation and soils of Africa, by H. L. Shantz
S27	. . . and C. F. Marbut . . . New York, Pub. jointly by the National research council and the American geographical society, 1923.
	[LC printed card 23–12087]

Example 5. A "subject-area card."

	fabt
	Hartshorne, Richard.
	Suggestions on the terminology of political boundaries
kps	[abstract].
A41	*In* Annals A. A. G., 26 (Mar. 1936), 56–57.

Example 6. A "subject card."

170	ac
	Joerg, Wolfgang Louis Gottfried, 1885–
170ac	. . . Brief history of polar exploration since the introduc-
J58	tion of flying . . . 1930.
	[LC printed card 31–80]

Example 7. An "area-subject card."

500	df
	Shantz, Homer Le Roy, 1876–
500df	. . . The vegetation and soils of Africa, by H. L. Shantz
S27	. . . and C. F. Marbut . . . New York, Pub. jointly by the National research council and the American geographical society, 1923.
	[LC printed card 23–12087]

Example 8. An "area-subject card"; note that this is identical with Ex. 5 except in the notation at the top of the card—by which it is filed.

676	**ec**
	Smith, Guy Harold.
676ec	The settlement and the distribution of the population in
S53	Wisconsin, by Guy-Harold Smith . . . [Madison, Wis.] 1929.
	[LC printed card 30–4550]

Example 9.

740	**gbc**
	Stappenbeck, Richard.
m740gbc	Dr. Richard Stappenbeck's karte der minerallagerstätten
1926S	von Süd-Amerika . . . Map of the mineral deposits of South America. Berlin, Dietrich Reimer (Ernst Vohsen), 1926.
	1: 3,750,000. 6 sheets ea. 71 × 75 cm. & pamphlet index 21 × 15 cm. Shows minerals by color and symbols; pipelines, communications, water-power.

Example 10. A map; in the "call number" note the initial letter "m" indicating that this item is filed in the map collection.

910	**f**
	Hu Shih.
kpa	The changing balance of forces in the Pacific.
F63	*In* For. Aff., v. 15 (Jan. 1937), 254–259.

Example 11.

910	**gmo**
	Miller, William Burke.
kpp	Flying the Pacific.
N18	*In* Nat. Geog. Mag., 70 (Dec. 1936), 665–707.

Example 12.

The filing order throughout the classed catalog is, first, by the notation (shown in boldface type in the upper corners of the cards in the twelve examples given above), and second, by the headings (usually author), etc. (The classed catalog does not require duplicate entries under author, title, subject, etc., and therefore its filing rules are simpler than those of a dictionary catalog.)

Part A, the *subject* portion of the classed catalog, comprises all cards that are arranged according to subjects, as shown in Appendix I of the present report. (All the "subject" cards are without a number notation, indicating area, in the upper left corner.) For any given subject there may be three kinds of entries:

(*a*) *General subject* entries (Examples 1, 2, 3, 6);

(*b*) *Subject-area-reference* entries (Example 4); and

(*c*) *Subject-area* entries (Example 5).

For any given subject notation the three types of entries are filed in the above order (Examples 3, 4, 5).

The *general subject* cards represent "general" items, *i.e.*, books, articles, etc., that deal with the subject in general terms or for some other reason are not capable of assignment to any specific area (Examples 1 and 6); they also include "world" items, in which there is specific treatment of all parts of the world by areas (Example 2), and world maps. These "world" items would logically require the number notation "100" in the upper left corner; for all "world" items, however, the area notation is omitted, in order that the general or theoretical material, and the systematic area material for the entire world, may be merged together.

A *subject-area-reference* card (Example 4)[8] provides cross-reference entries to all of the area-subject cards on which the given subject notation appears in the upper right corner; each number on the body of the card indicates that, in Part B, the "area-subject" portion of the catalog, *one or more* cards on that subject will be found under that area notation. (On Example 4 the *500* indicates that one or more cards will be found with the notation which appears on Example 8.)

A *subject-area* entry (Example 5) represents a book, an article, or a map relating to some specific area, large or small (but not to the entire world), which is regarded as of special importance to the student of the subject as a whole.[9] Such entries are always duplicated in the area-subject portion of the catalog (Examples 5 and 8).

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[8] As indicated by the example, these subject references to the area-subject entries constitute an integral part of the classed catalog. An alternative to the subject-area-reference card in this form, filed in the main classed catalog, would be 5×8 in. cards, on which would be printed an outline map of the world, with the area notation in each area. These large cards would necessarily constitute a separate file; one card would be used for each subject, the areas being marked on the map corresponding to the area-subject entries which have been made for that subject in Part (B) of the catalog.

[9] As regards a particular item, one must choose between making a "subject-area-reference" entry and a "subject-area" entry. Obviously, either kind of entry might be made to the *exclusion* of the other. The objectives to be served by these two types of entry (if one is not used exclusively) are:

(1) To enable the student interested in the general aspects of a subject *as a whole*, to find the pertinent material whether or not classifiable by areas.

(2) To enable the student interested in a particular subject pertaining to a relatively large area to find all of the pertinent material. Examples of this kind of subject are "Rainfall in South America," "Glaciers in the Polar Regions," "Manufacturing in the Far East," "Cotton Growing in the Tropics."

It is evident that, with reference to both of these objectives, specific "subject-area" entries (following the "general subject" entries) are more convenient than

Part B, the *area-subject* portion of the classed catalog, comprises all cards that are arranged in the first instance by areas. The filing order is therefore determined (1) by area notation in the upper left corner, (2) by the subject notation in the upper right corner, and (3) by the heading (usually author), etc.

Ordinarily only one card is entered in the classed catalog for any book, article, or other geographical item—either a *general-subject* or an *area-subject* card.[10] Occasionally when an item deals with two or more distinctive subjects (as, for example, rainfall in relation to crop yields), or with two different areas, it may be desirable to make two or more cards.

In consulting the classed catalog, constituted as described above, the student interested in climatology, for example, will go to Part A where, under **cf** [Meteorology and climatology], he will find all the items relating to the subject in general and in its world-wide treatment—if "subject-area-reference" entries are made he will also find references to *all* of the material on the subject that is dispersed throughout Part (B) by specific areas; if complete "subject-area" entries are made, corresponding to all "area-subject" items in Part (B), he will of course find everything classified under **cf** together in one place. The student interested in the geography of Venezuela will go to Part (B), 753, where he will find all material relating directly to that area.

Each card in the classed catalog should indicate where the book, magazine article, map or other material is housed. Printed Library of Congress catalog cards may be used in this file, whenever convenient.

The guide cards in the classed catalog may carry not only the notation (which is followed in the filing sequence), but also the subject or area which that notation connotes. This will save time that might otherwise have to be spent in consulting the classification scheme, or the area-subject index which is explained below.

(2) *An alphabetical catalog of authors (and certain titles).*

For authors, there will be one card for each book (a printed LC card may be used), or for each article having a bona fide author, or for any map

"subject-area-reference" entries, because they bring all of the subject-area material together in one place, instead of referring the consultant to several or many areas in Part (B) of the catalog. If, however, specific "subject-area" entries are made, corresponding to *all* of the "area-subject" entries in Part (B), which is next described, the subject portion of the catalog, Part (A), will necessarily be larger than Part (B) because it will contain "general subject" cards as well.

[10] That is to say, only one card is ordinarily made unless, for *every* "area-subject" card in Part (B), a duplicate "subject-area" card is filed in Part (A), thereby excluding the use of "subject-area-reference" cards; this alternative is explained in the footnote immediately preceding.

which is regarded as of a significance appropriate to inclusion in the research catalog. Each card for a book or a map will bear the call number.

Title entries will be made, one card for each title, only when the title is significant or distinctive. A title that corresponds closely with the area or subject, by which it would readily be found in the research catalog, requires no entry in this alphabetical file unless it is also distinctive, as, "A reconnaissance geography of Japan."

ee B59	Bowman, Isaiah. Geography in relation to the social sciences . . . [LC printed card 34–27078]
431ac T43	Reconnaissance geography of Japan Trewartha, Glenn Thomas, 1896– . . . A reconnaissance geography of Japan, by Glenn Thomas Trewartha . . . Madison, University of Wisconsin, 1934. [LC printed card 34–28366]
431ac T43	Trewartha, Glenn Thomas, 1896– . . . A reconnaissance geography of Japan, by Glenn Thomas Trewartha . . . Madison, University of Wisconsin, 1934. [LC printed card 34–28366]
kps A41	Whittlesey, Derwent. Major agricultural regions of the earth. *In* Annals A. A. G., 26 (Dec. 1936), 199–240. With map.

An alphabetical author catalogue, of the character illustrated above, corresponds closely to the entries that would appear in an ordinary dictionary catalog, so far as these items are concerned; it would therefore supplement the classed arrangement of the books and other materials. A complete author catalog of this type is believed to be desirable as an adjunct of the classed catalog.[11] The arrangement of cards is obvious—alphabetically by headings (authors, with an occasional title entry) and, for each author, alphabetically by titles.

(3) *An alphabetical index of areas and subjects.* This file also serves one of the purposes of the dictionary catalog, but it is quite different in detail. It will provide only one card for each *area heading* which would

[11] An alternative to a complete author catalog, if limitations of space and labor dictate, is a catalog comprising one card for each author, that card containing a list of the classed catalog entries for the author in question. Such cards would be very similar in form to the "subject-area-reference cards" previously explained.

normally appear in a dictionary catalog, and will give the notation indicating where it appears in the classed or research catalog. Similarly, it will provide only one card for each *subject heading* which would normally appear in a dictionary catalog, with the classed catalog notation.

Inasmuch as the classed catalog arranges material by area and subject, the classed catalog and the normal dictionary catalog, under any specific area-subject classification, would practically duplicate each other, card for card. For example, in the dictionary catalog under "Polar regions—Exploration" and in the classed catalog under the corresponding notation "**170 ac**" the same titles would normally appear, in the same order if the two were equally complete. Therefore it will be satisfactory and economical to make this alphabetical list of areas and subjects simply an index to the subject and area entries in the classed catalog.[12]

The illustrations given below include, among others, all the areas and subjects that appear in the illustrations previously given under (1) *"the classed or research catalog."*

Africa 500
Agricultural regions ..... gcc
Airways, airports and landing fields ..... gmo
Antarctica; Antarctic regions 180
See also Polar regions, 170
Arctic Sea; Arctic regions 171
See also Polar regions, 170
Aviation ..... gmo
Boundaries, International: Definitions, terminology ..... fabt
Europe 200
Exploration; Travel and exploration ..... at
Geography, General: scientific ..... ac
Geography: Teaching ..... j
History ..... p
Japan 431
Mineral resources ..... gbc
North America 600
Pacific Ocean 910
Phytogeography; plant geography ..... df
Plant geography; phytogeography ..... df
Polar regions 170

[12] This alphabetical index should embrace the names of all areas, and the terms for all subjects, for which actual entries have been made in the classed catalog, with necessary cross-references; and it may also properly include the equivalent or related terms found as secondary headings or tracings on printed LC catalog cards, inasmuch as they represent headings that are in use in general libraries, with which the consultants of the catalog may be familiar. For example, when the notation *df* first appears in the subject portion of the classed catalog, "Phytogeography . . . df" and "Plant geography . . . df" should be entered in the alphabetical index of areas and subjects.

See also Arctic regions, 171
Antarctic regions, 180

Political geography	f
Population, Geography of	ec
South America	740
United States	630
Wisconsin	676
World	100

Provision for special types of material. Books, maps, atlases, text material in vertical files, globes, relief models, photographs, etc., for practical reasons must usually be physically arranged in separate categories, each type by itself. For each type of material the sequence should usually be in strict accordance with a single classification scheme. The problem is analogous to that of filing oversize books in a general library, where the practice is simply to prefix to the call number a letter "f" or "q" indicating that the book is shelved with the folio or quarto volumes.

Each geographical library may readily devise its own system, presumably analogous to the call number "m400caq 1927," in which the initial letter "m" indicates that the map in question is "shelved" in the regular equipment of the map collection.

II. GENERAL LIBRARIES

The committee can not overlook the situation that prevails in general libraries in the handling of geographic materials, and therefore certain suggestions are submitted in the hope that something may be done to improve the general library technique in this regard.

The suggestions of the committee are based on the assumption that general libraries will continue to use their present classifications of materials (usually either the Dewey decimal or the Library of Congress classification), with only minor improvements and some expansion; and that most of them will continue to maintain only dictionary catalogs.

CLASSIFICATION

It would seem that the classification of geographical literature should be perhaps as comprehensive as that of geological literature. In the Dewey classification, 550–559 covers Geology, the main divisions of which are:

551 Physical and dynamic geology
552 Lithology, petrography, petrology
553 Economic geology
554 Geology of Europe
555 Geology of Asia
556 Geology of Africa
557 Geology of North America

558 Geology of South America
559 Geology of Oceanica Polar regions

Each of the first three has several score subject subdivisions, and each of the others has area subdivisions similar to that for modern history, 940–999.

Geography, in the Dewey classification, is very much less adequately classified, in 910–919 "Geography and travels," the main subdivisions of which are:

910.2 Traveler's manuals, guidebooks
910.3 Dictionaries, gazetteers
910.4 Circumnavigations, ocean travel, shipwrecks and disasters, piratic adventures
910.5 Periodicals
910.6 Societies
910.7 Study and teaching of geography; school map drawing
910.8 Collections of travels, etc.
910.9 History of geography, travels, explorations, etc.
911 Historic growth and changes in political divisions, etc.
912 Maps, atlases, plans of cities, etc.
913 Antiquities, archaeology, of special countries
914 Europe
915 Asia
916 Africa
917 North America
918 South America
919 Oceanica and Polar regions

Each of the classes 914–919 inclusive is subdivided by area, in the manner employed for modern history, 940–999.

So far as notation is concerned, the Dewey classification is not adapted to the making of geographical subject subdivisions which would be as short and convenient as those employed for geology, but presumably an adequate subject classification could be introduced, chiefly in 910.1.

The Library of Congress classification, in "Class G. Geography, Anthropology, Folk-lore, Manners and Customs, Sports and Games" is less geographical in its organization, and less inclusive of geographical material, than the Dewey decimal class cited above.[10] It provides such subdivisions

[10] That this classification "G" is less fortunate than that of any other class in the Library of Congress system seems to be recognized. For example, Sayers remarks: ". . . class G. Geography and Anthropology, is one of the most curious in the system, and may be said to cover the world, its exploration, scientific measurement and plotting; its inhabitants, their kind, distribution, folklore, culture, customs and amusements—this location of the recreative arts is curious and noteworthy." (W. C. Berwick Sayers: *A Manual of classification for librarians and bibliographers.* London, 1926, p. 169.)

as "G614. Arctic Regions. Juvenile works" and "GF37. Anthropogeography. General works. Popular works," but Regional Geography is classed with History, and Economic Geography with Economics, in Economic History.

The adoption by general libraries of a more satisfactory and useful classification of geographical literature is much needed. The problem is complicated, and the professional librarian, unless he is also a geographer, can hardly be expected to ascertain what needs to be done, and to prepare, unaided, an adequate classification of all the varied types of geographical literature. Librarians might be inclined to devise such a classification if a geographer-librarian, who has the viewpoint of both groups of specialists, were to write a paper setting forth the relationships of geography and its various branches to other fields of knowledge—for example the relationships between economic geography and economics, and between anthropogeography and anthropology.

SUBJECT HEADINGS

Whether or not general libraries adopt a more adequate classification and arrangement of the geographical literature on their shelves, that literature may be made more accessible by the revision and amplification of the subject headings and area headings employed in the card catalog.

The headings used by the Library of Congress appear in the tracings on the printed catalog cards, and many general libraries use those headings even though they may use the Dewey decimal arrangement on the shelves. This matter of headings is rather complicated. The Library of Congress subject headings apparatus comprises the following publications (together with supplements thereto):

1. Subject headings used in the dictionary catalogues of the Library of Congress. Edited by Mary Wilson MacNair. 3d edition, 1928.
2. Subject subdivisions:
   (A) Under names of countries, states, etc.
   (B) Under names of cities.
   (C) Under general subjects.

6th edition, 1924.

3. Subject headings with local subdivision:
   (A) Headings with indirect subdivision.
   (B) Headings with direct subdivision.
   (C) List of local divisions (States, Provinces, etc.) to which subdivision is always direct.

Compiled by Mary Wilson MacNair. 5th edition, 1935.

The list of subject headings which was prepared for use in the map collection of the Department of State was based in large part upon the per-

tinent headings which appear in the Library of Congress publications listed above; it includes additional headings, however, which seemed necessary. This list constitutes an appendix (Appendix C, 28 pages in length) in the multigraphed "manual" entitled "Classification and cataloging of maps and atlases" (referred to in footnote 2 on page 55. This is a composite list of subjects, some of which are to be used without area subdivisions, others with area subdivisions, and still others as subject subdivisions under areas.

This list of subject headings, adapted primarily to maps, could be expanded to embrace other subjects pertinent to geographical literature; possibly it might be simplified somewhat in form. Such a list of subject headings, with a preface explaining why it had been prepared and how it should be used, might well be published and made available to librarians.

The committee which prepared this report, consisting of Lawrence Martin, Wellington D. Jones, and S. Whittemore Boggs (chairman), was appointed at the meeting of the Association in 1931 at the suggestion of John K. Wright, to cooperate with the American Geographical Society in developing a scheme of classifying and cataloging geographical materials in special geographical libraries much more effectively than is done in general libraries—for example by the Library of Congress and by the Dewey decimal system. The committee has met several times, when the three members have been in attendance at meetings of the Association of the American Geographers; otherwise the work of the committee has been done largely by correspondence between the chairman and Professor Jones and Dr. Wright, and by numerous conferences of Colonel Martin and the chairman.

The report which is now presented to the Council has been put into its present form by the chairman. And although he has corresponded with Professor Jones, and discussed the written report with Colonel Martin, the chairman must accept responsibility for the report as it stands. The fertile suggestions and wide experience of both Colonel Martin and Professor Jones find expression throughout the report, and the chairman believes that both gentlemen concur in all of its essential ideas and conclusions.

Washington, D. C.,
December, 1936.

APPENDIX I

CLASSIFICATION: SUBJECTS

SUMMARY

Notation	*Subject*
a	General Geography: General description
at	Travel and Exploration
b	Mathematical Geography
bb	Size and shape of the earth
bd	Movements of the earth
bf	Determination of positions: Geodetic surveys
bm	Cartography
c	Physical Geography
caa	Distribution of land and water
cab	Geophysics and geochemistry
caq	Geology
cb	Geomorphology
ce	Oceanography
cf	Meteorology and Climatology
d	Biogeography
dc	Ecology
df	Plant geography or phytogeography
dr	Animal geography or zoögeography
e	Human Geography
eab	Anthropogeography
ec	Geography of population
ee	Social and cultural geography
f	Political Geography
g	Economic Geography
h	Military and Naval Geography
j	Geographical Teaching; Institutions
k	Aids to Geographical Study: Collections: Biographies
n	History of Geography
p	History

LIST OF SUBJECTS*

*a	GENERAL GEOGRAPHY: GENERAL DESCRIPTION (With reference to maps, general maps—no specific subject)
ab	General geography or description, popular (see also *ata*)
ac	General geography or description, scientific (see also *atc;* for statistics, see *ea*)

* The subjects indicated by an asterisk are, in most instances, those that have been utilized in cataloging the maps in the map collection of the U. S. Department of State. This selection of subjects may prove nearly sufficient for map classification and cataloging in some map collections; these subjects are, of course, equally adapted to the classification of geographical literature. Many subjects that are not marked by an asterisk will also prove to be adapted to map classification.

Notation	*Subject*
*acg	Studies in regional geography by professional geographers; maps of geographic regions
ae	Geographical regions, "landscapes," etc. (principles of regional geography) (specific regions under *ac;* see also *cba, edf, gbb*)
af	Regional or national handbooks, yearbooks, etc.
ag	Guidebooks, itineraries (for guides to cities, see *edc;* guidebooks for immigrants and colonists, see *ecr*)
ah	Nautical manuals, coast pilot books, river navigation manuals
*aj	Navigation charts; hydrographic charts
ak	Syllabi; Outline and base maps
am	Scenery and its appreciation
ao	Cycles (see also *cbml, cbuc, cfsc, eas*)
*ap	Pictorial geographic material; Pictorial maps; Cartoon maps
*at	TRAVEL AND EXPLORATION
ata	Travel and exploration, popular (see also *ab*)
atc	Travel and exploration, scientific reports (see also *ac*)
atg	Geographical field work and its methods
atm	Travelers' and explorers' manuals on the art of traveling, equipment required, etc.
*au	Tourism; Tours; Tourist maps
b	MATHEMATICAL GEOGRAPHY
bb	Size and shape of the earth
bbc	Geodesy (works in geodetic investigations, the predominating purpose of which is to determine the size and shape of the earth; geodetic surveys as basis primarily for topographic maps under *bf*)
bbf	Measurement of the length of a degree
bd	Movements of the earth
*bdk	Time; Standard times and time zones; Date lines; (longitude, *bfh;* chronometers, *bjs*)
*bf	Determination of positions; Geodetic surveys (see also *bbc* and *bbf*). (With reference to maps: Triangulation and triangulation nets; precise leveling nets; etc.)
bfa	Field astronomy; geographical coordinates and methods of determining them
bfc	Latitudes and methods of finding
bfd	Figures for latitude
bfe	Methods of finding latitude
bfh	Longitudes and methods of finding (see also *bdk*)
bfk	Figures for longitude
bfl	Methods of finding longitude
*bfm	Prime meridians
bg	Metrology
*bh	Areas and their determination; Comparative area maps (two or more areas on the same scale)

Notation	*Subject*
bj	Surveying; map-making or map-sketching in the field (see also *bbc, bfa, bg, bjs*)
bjb	Triangulation
bjc	Plane table surveying
bjd	Traverses and distance measuring
*bje	Cadastral surveying; Cadastral maps
bjf	Altitudes and methods of determining them
bjg	Figures for altitudes
bjh	Methods of finding altitudes
bjj	By triangulation and levelling
bjk	By barometric observations (instruments, *bjs*)
bjl	Photographic surveying (aeronautical surveying, see *gmos*)
bjm	Marine surveying (see also *ce*)
bjn	Navigation (compass under *can*)
bjp	Aeronautical navigation
bjr	Great circle navigation
bjs	Surveying and cartographic instruments (compass, *can*)
bm	Cartography
bma	Construction and use of maps (surveys and surveying, *bj*)
*bmb	Map projections
*bmd	Map content, drafting, conventional signs, and symbols, etc.
bmf	Map reproduction
bmh	Map reading, map anaylsis
bmr	Relief maps (technique of construction, etc.)
bms	Globes
bo	Discussions of existing or proposed maps
*bp	Status of the mapping of the world and of larger parts (areas mapped, and relative reliability)
*c	PHYSICAL GEOGRAPHY
caa	Distribution of land and water
cab	Geophysics and geochemistry
cad	Density and mass of the earth
cag	Gravity
cak	Interior of the earth
*cam	Terrestrial magnetism
*can	Magnetic compass; magnetic deflection and variation
cao	Atmospheric electricity
*caq	Geology (The geographer's primary interest in geology is centered in those aspects of geology which are concerned with the physiographic features of the earth's surface and with the distribution of mineral resources. In this geographical classification these two subjects are included topically under *cb,* Geomorphology, and under *gbc,* Mineral resources.

Notation	*Subject*
	Hence the aim should be, so far as possible, to throw geological publications under *cb* and *gbc*, reserving *caq* for publications on historical and structural geology that are of but slight geographical interest.
*car	Paleogeography
cas	Geochronology
cb	Geomorphology
*cba	Relief; land forms; Topographic maps, etc. (see also *ad, edf*)
*cbab	Physiographic regions
*cbad	Physiographic diagrams and block diagrams
*cbag	Relief models (in three dimensions)
cbb	Work of forces originating in the interior of the earth
cbc	Geotectonic movements and resulting land forms
cbd	Changes of level over broad areas
*cbe	Folding, faulting, grabens, horsts, etc.
cbg	Isostasy
cbgc	Lateral displacement of continents (Wegener's hypothesis)
*cbh	Volcanoes and related forms
*cbhb	Batholiths and laccoliths
*cbhe	Lava plains and plateaus
*cbj	Seismology; earthquakes
cbk	Work of the atmosphere (for deserts, steppes, etc., see *dg*)
cbkc	Weathering, wind erosion
cbkd	Dunes
cbkl	Loess
cbks	Soils
cbkt	Soil classification
cbku	Soil erosion
cbm	Work of flowing surface water
cbma	Fluvial erosion in the large (see also *cbub*)
cbmd	Drainage patterns
cbme	River capture
cbmg	Genetic classification of rivers and valleys (consequent, subsequent, etc.)
*cbmj	Drainage basins; River systems; Rivers
cbmk	River valleys (*i.e.*, valleys of individual streams)
cbml	Cycles of stream erosion (in so far as individual streams are concerned)
cbmn	Base level (in respect to individual streams)
cbmp	Riverbeds
cbmq	Waterfalls, rapids
cbmr	Flood plains
cbms	Meanders

Notation	*Subject*
cbmt	Deltas
cbmu	Alluvial fans
cbn	Work of subterranean water
cbnc	Speleology (caves)
cbng	Surface forms produced by work of subterranean water; karst topography
cbr	Work of (or in) standing water
cbrc	Shorelines
cbrf	Shoreline protection
cbrm	Marshes, swamps
cbrq	Coral formations
*cbs	Ice sheets, glaciers, ground ice and their work
cbsa	Ice sheets; continental glaciation
cbsc	Land forms produced by ice sheets (roches moutonnées, kames, eskers, moraines, etc.)
cbsf	Mountain glaciers and snow fields
cbsg	Land forms produced by mountain glaciers (U-shaped valleys, cirques, tarns, moraines, etc.)
cbsk	Ground ice, frost, etc., and their work
cbu	Land forms due to the combined work of different agencies
cbub	Erosion, erosional forms
cbuc	Cycles of erosion, peneplanes, etc.
cbud	Special erosional forms
cbuf	Bad lands
cbuh	Buttes, mesas, hoodoos, etc.
cbuj	Sedimentation
cbuk	Plains
cbul	Plateaus
cbum	Mountains
cbun	Mountain valleys and passes
cbup	Mountaineering
cbuq	Landslides, avalanches
cbur	Talus slopes
cbus	Islands
cbuv	Exceptional physiographic features (*e.g.*, meteor craters, mud volcanoes, etc.)
cd	The waters of the lands
cdc	Rivers; potamology (for geomorphological work of rivers see *cbm;* for rivers as lines of communication, *gmfb*)
cdd	Floods
cdf	Animal and vegetal life in rivers (for river fisheries, *gdd*)
cdh	Lakes; limnology
cdj	Lake floors
cdk	Composition, temperature, etc., of lake waters
cdm	Lake ice
cdo	Salt lakes, salines, etc.
cdq	Movements of lake water
cdr	Changes in level of lakes

Notation	*Subject*
cds	Animal and vegetal life in lakes (for fisheries, see *gdd*)
cdt	Subterranean waters, including ground water (see also *cbn*)
cdu	Springs, hot springs, geysers, etc.
ce	Oceanography (for geomorphological work of the oceans, see *cbro, cbrq;* for marine transportation, see *gmfs*)
*ced	The sea floor
*cee	Depths; soundings; methods of sounding
*ceg	Composition, temperature, salinity, visibility, etc., of sea water
ceh	Marine ice
*cei	Icebergs; limits of icebergs, etc.
cej	Movements of sea water
cek	Mean sea level
cem	Changes in mean sea level (see also *cbe*)
*ceo	Ocean currents
*ceq	Tides and local currents (see also *gfdh*); cotidal lines
ces	Marine biology (for fisheries, see *gdd*)
*cf	Meteorology and Climatology
*cfb	Meteorology (maps: weather maps)
cfd	Solar insolation and radiation
*cfh	Temperature
*cfj	Pressure
*cfk	Atmospheric circulation; Winds
cfkb	Prevailing winds
cfkd	Secondary circulation and its results
*cfke	Cyclones and anticyclones
*cfkf	Tropical cyclones
*cfkg	Thunderstorms; Storms
cfkh	Tornadoes, waterspouts, whirlwinds
cfkj	Local winds
cfm	Moisture in the atmosphere
*cfmb	Precipitation
*cfmc	Clouds
*cfmf	Fogs
*cfmh	Droughts
*cfn	Frost
cfp	Aeronautical meteorology
cfq	Meteorological instruments
cfr	Weather forecasting
Notation	*Subject*
*cfs	Climatology
*cfsa	Climatic regions
*cfsc	Changes of climate; Paleoclimatology
*d	BIOGEOGRAPHY, including vegetational regions
dc	Ecology
df	Plant geography or phytogeography
*dg	Vegetational regions (for forests, see *gcr*)

Notation	*Subject*
dh	Deserts (see also *cbk*)
dk	Steppes and prairies
dm	Moors and heaths
do	Tundra
*dr	Animal geography or zoögeography (for aquatic life, see *cdf, cds, ces;* for fisheries, *gdd*)
ds	Birds
dt	Bird migrations
du	Insects
*e	HUMAN GEOGRAPHY
ea	Comprehensive statistics; statistical methods
eab	Relations of man and the geographical environment; anthropogeography
*eac	"Human use" regions
eaf	Adjustments of man to the geographical environment; influences of geographical environment
*eah	Geography of natural calamities (see also *cbuq, ccd, gch, gcre, gcuc*)
eak	Influence of man on the geographical environment
eam	"New" or "made" land
eas	Cyclic interpretations of history
eb	Physiological geography
ebc	Origin and antiquity of man
ebd	Physiological influences of geographical environment (*e.g.*, effects of altitude, of life in the tropics, etc.)
ebg	Somatic anthropology
ebk	Medical geography (*e.g.*, distribution of diseases, medical service, etc.)
*ebm	Health, disease, efficiency (in relation to areas, climate, etc.)
*ec	Geography of population (for census reports and other statistics, see *ea*)
*ecb	Density and distribution of population
*ecc	Demography: births, deaths, marriages, etc.
*ecd	Composition of population (ethnic or by nationalities)
*ecf	Movements of population (for colonies and colonial policy, see *fg*)
*ecg	Nomadism
*ecj	Tribal migrations: "Völkerwanderungen"
*eck	Emigration; immigration
*ecm	Immigration quotas
eco	Refugees
*ecr	Settlement of population on the land (see also *fg*)
*ed	Forms of settlement; land tenure
eda	Rural settlements; villages, farms, etc.
edb	Rural land tenure
*edc	City geography (cards are filed by cities; for each city they are filed under the following headings)

Notation	*Subject*
edf	City and town planning (see also *gbbc*)
edg	Urban sanitation
edh	Urban water supply
edj	Urban housing (see also *enb*)
edk	Urban land utilization (see also *gbb*)
edm	Urban industries (see also *gf*)
edo	Urban transportation (see also *gm*)
edq	Urban recreation, parks (see also *eqr*)
edr	Port and harbor facilities (see also *gm*)
*ee	Social and cultural geography
*eg	Archaeology; Archaeological monuments
egc	Civilizations (stages, periods, etc.)
*ej	Linguistic geography
eja	Geographical nomenclature
*ek	Religions
*ekb	Christianity
*ekc	Ecclesiastical organizations, sects, denominations; administrative areas, provinces, sees, etc.
*eke	Missions
*ekj	Judaism
*ekk	Islam
*ekm	Brahminism
*ekn	Buddhism
*eko	Other religions
*en	Material culture
ena	Clothing (*i.e.*, "costumes," etc. See also *gct*)
enb	Shelter (Habitations) (for housing problem in cities see *edj*)
*enc	Dwellings (types)
enf	Arts and crafts (basket-work, pottery, weapons, weaving, etc.)
enh	Implements
enm	Music
enp	Fine arts
eq	Customs, folk-lore, etc.
eqr	Recreation; sports
er	Education, intellectual life, etc.
erd	Literacy and illiteracy
eu	Slavery
*f	POLITICAL GEOGRAPHY
*fa	Boundaries
*faa	Boundaries with the high seas; territorial waters
*fab	International boundaries
faba	Bibliography
fabb	Requirements of boundaries (functional and administrative)
fabc	Functional requirements

Notation	*Subject*
fabd	Delimitation and demarcation requirements
fabf	Actual functioning or working of boundaries (including disputes antedating delimitation)
fabg	Disputes
fabh	Boundary incidents (isolated instances or points)
fabj	Administration of boundary
fabl	Boundary types
fabm	Physical types
fabn	Geometrical types
fabo	Anthropogeographic types
fabq	Neutral zones, boundary marches, etc.
fabr	Processes of settling disputes, and of establishing and administering boundaries, provisions of treaties, etc.
fabs	Means of settling disputes (negotiations, etc.)
fabt	Definition of boundary (terminology, maps, etc.)
fabu	Surveying, mapping, and demarcation
fabv	Provisions of treaties, etc.
*fac	Intra-national boundaries
*fb	The state and its territorial divisions; administrative and judicial divisions (provinces, counties, etc.)
*fbc	Judicial divisions
*fbe	Electoral districts
fbk	Capitals
*fc	Government
*fcb	Political data; election results; party representation in legislative bodies, etc.
*fce	Rival factions within a country
*fcg	Customs offices, districts, etc.; Free trade areas
*fcm	Public domain, land grants, etc.
*fcp	Diplomatic and consular representation; consular districts
*fd	Sovereignty
*fda	Claims of sovereignty; Spheres of influence; concessions
*fdb	Territorial gains and losses; Territorial expansion
*fdc	Plebiscite areas and plebiscites
*fg	Possessions, dependencies and colonies; colonial policy
*fh	International alliances; Leagues; International rivalries; "Geopolitik," etc.
fj	Laws
fm	Taxation
*g	ECONOMIC GEOGRAPHY
*ga	Economic regions
*gb	Natural resources and industries based upon them
gba	Conservation of natural resources, general policies (for conservation of particular types of resources see *gbe, gcd, gcrc, gdc*)
*gbb	Land utilization (for urban land utilization see *edk;* for agricultural land utilization, see *gcd*)

Notation	*Subject*
*gbbc	Comprehensive regional surveys; regional planning (see also *edf*)
*gbbe	Land classification surveys and their methods
*gbbg	Reserves, parks, etc. (see also *gbbk*)
*gbbk	Use of land for recreational purposes (see also *gbbg*)
*gbc	Mineral resources; mining; manufactures based essentially on the use of mineral resources
gbd	Prospecting
gbe	Conservation of mineral resources
gbf	Metals and manufactures based thereon
gbfa	Aluminum, bauxite
gbfb	Antimony
gbfc	Copper, bronze
gbfd	Gold
gbfe	Iron and steel
gbfg	Lead
gbfh	Manganese
gbfj	Nickel
gbfk	Platinum
gbfm	Pyrite
gbfo	Silver
gbfp	Tin
gbfr	Tungsten
gbft	Zinc
gbfw	Other metals
gbg	Non-metals and manufactures based thereon
gbga	Alum
gbgb	Asphalt
gbgc	Asbestos
gbgd	Borax
gbgf	Carbon and carborundum
gbgg	Clay
gbgh	Coal, lignite, graphite, by-products
gbgj	Peat
gbgk	Gravels
gbgm	Gypsum
gbgn	Infusorial earth
gbgo	Iodine
gbgp	Isinglass & Mica
gbgq	Kaolin
gbgr	Limestone
gbgs	Marble
gbgt	Nitrates (see also *gcde*)
gbha	Petroleum, natural gas, by-products
gbhc	Phosphate
gbhe	Phosphorus
gbhf	Potash
gbhh	Precious and semi-precious stones

Notation	*Subject*
gbhj	Salt
gbhk	Sand
gbhm	Building stone
gbhp	Other non-metals
gbm	Food supply
*gbnf	Famines
*gc	Agriculture; agricultural products and manufactures based thereon
*gca	Soils; soil maps, etc. (see also *gbbe*)
gcb	Geographical distribution of agricultural products and of systems of agricultural production
*gcc	Agricultural regions
gcd	Agricultural methods; conservation and reclamation of agricultural resources (for soil erosion, see *cbku*)
gcde	Fertilization
*gcdg	Dry farming
*gce	Irrigation
*gcf	Drainage
*gch	Pests, diseases, etc.
gcj	Gardens and horticulture
gcje	Market gardens
gcjg	Flower gardens
gck	Vegetable products; Crops
gckc	Cereals
gckf	Wheat
gckg	Rice
gckj	Corn
gckm	Vegetables
gckp	Root crops
gcm	Fruits and berries
gcmd	Tropical and sub-tropical fruits
gcmf	Small fruits
gcmh	Berries
gcmk	Melons
gcmp	Vineyards (for wine see *gcpg*)
gcn	Tree crops
gcnc	Coffee
gcng	Tea
gcnk	Yerba mate
gcnn	Nuts
gcnr	Rubber
gcns	Wild
gcnt	Plantation
gco	Sugar
gcob	Beet
gcoc	Cane
gcpc	Vegetable oils
gcpe	Spices

Notation	*Subject*
gcpg	Alcoholic beverages
gcpj	Tobacco
gcpk	Drugs
*gcr	Forests and forestry
gcra	Geographical distribution of forests and forest types
gcrc	Conservation of forest resources; reforestation
gcre	Insects, pests, blights
gcrf	Forest fires
gcrg	Silviculture
gcrk	Exploitation of forests
gcrm	Logging, lumbering
gcrn	Farm woodlots
gcrp	Forest products
gcrq	Timber
gcrs	Wood pulp
gcru	Functional value of the forest cover (as protection against soil erosion, excessive run-off, etc.)
gct	Textile industries
gcta	Cotton
gctb	Wool (see also *gcup*)
gctc	Silk
gctd	Artificial silk industry
gctf	Fibers
gcu	Animal industries and products; manufactures based thereon
gcub	Geographical distribution of animal industries
gcuc	Diseases, pests, etc.
gcud	Animals as beasts of burden
gcuf	Transhumance
gcug	Stock industry by types of animals
gcuh	Meat cattle
gcuj	Meat packing
gcuk	Leather industries
gcum	Dairy industries
gcun	Milk supply
gcup	Sheep (see also *gctb*)
gcuq	Swine
gcur	Poultry
gcus	Bees
gcut	Fur industry
gcuu	Hunting and trapping
gcuv	Game laws
*gd	Products of oceans, rivers, and lakes (see also *cdf, cds, ces, gfdh*)
gdb	Geographical distribution
gdc	Conservation of fishery resources (fish hatcheries, etc.)
*gdd	Fisheries
gdg	Shell fish
gdk	Pearl industries

Notation	*Subject*
*gdm	Whaling
gdp	Minerals from sea water
*gf	Geography of manufacturing industries; "industrial geography"
*gfd	Power in general
gfda	Animal power
*gfdc	Water power, hydroelectric power (for urban water supply, see *edh*)
gfde	Electric power
gfdh	Tidal power
*gfe	Manufactures in general
	[Food products, see specific subheadings under *gc, gcu*]
	[Textiles, see specific subheadings under *gct*]
	[Iron and steel products, see *gbfe*]
	[Lumber products, see *gcrq*]
	[Leather products, see *gcuk*]
	[Liquors, see *gcpq*]
	[Stone, clay and glass products, see specific headings under *gbg*]
	[Products of metals other than iron and steel, see specific headings under *gbf*]
	[Tobacco, see *gcpj*]
gff	Paper and printing
gfg	Chemicals
gfh	Vehicles
gfj	Shipbuilding
gfk	Miscellaneous manufactures
*gm	Transportation and communication
*gmb	Land transportation
gmbb	Primitive modes of transport
*gmbd	Roads, etc.
*gmbf	Caravan routes
*gmbh	Roads, trails
gmbj	Bridges, tunnels
*gmbm	Motor transport; Motorbus routes
gmbr	Road laws
*gmd	Postal routes; Postal rate zones
*gme	Railroads; Street railroads
*gmf	Water transportation
*gmfb	River and lake; Navigable waterways
*gmfc	Canals
*gmfs	Marine transportation; Steamship and sailing routes; Sailing distances
	Ports, etc., (see *edr*)
*gmg	Communication by wire and wireless
*gmh	Telegraph and cables
*gmk	Telephone
*gmm	Radio

Notation	*Subject*
gmo	Aviation (for aeronautical meteorology, see *cfp;* for aeronautical navigation, *bjp*)
*gmof	Airplane flights of exceptional interest
gmoh	Airplane as a carrier
gmos	Airplane surveys (see also *bjl*)
*gmp	Airways, airports, landing facilities; Aviation zones (prescribed, prohibited, etc.); Air bases
*gmr	Air mail routes
*gp	Commerce, trade, etc.
*gpd	Trade routes
*gpk	Fairs, markets, etc.
gpm	Languages of commerce
gq	Tariffs
gr	Finance, wealth, banking, exchange, etc.
grc	Coins and currencies
grd	Foreign exchange
grf	Exchanges and bourses
gt	Labor
gtc	Occupations
*h	MILITARY AND NAVAL GEOGRAPHY (All of the items of a single war may be grouped together under the area that embraces the whole, rather than scattered through the minor geographic divisions in the numerical classification. For example, all items concerned with the Balkan War of 1911 may be classified under Balkan Peninsula in 370 hc 1911.)
*ha	Military districts and fortifications
*hac	Forts; Military outposts or settlements
*hb	Naval bases
*hc	War maps
*hca	Campaigns
*hcb	Battle lines
*hcc	Battlefields
*hcd	Devastated areas; War reconstruction
*hcj	Naval engagements
*hf	Strategic geography
j	GEOGRAPHICAL TEACHING: INSTITUTIONS ENGAGED IN GEOGRAPHICAL WORK
ja	Teaching of geography
jc	Methodology
jd	Elementary textbooks and maps
jf	Outlines, syllabi, etc.
jj	Geographical and related institutions
jm	Societies
jn	Congresses

Notation	*Subject*
jp	Government bureaus and commissions
jr	Departments in universities
js	Geographical museums
k	AIDS TO GEOGRAPHICAL STUDY; COLLECTIONS; LIBRARY ECONOMY: BIOGRAPHIES
kb	Bibliographies
kbg	Geographical bibliographies
kbk	Bibliographies of maps and atlases
kd	Dictionaries, geographical
ke	Encyclopedias, geographical
kg	Gazetteers
kh	Atlases
kk	Collections of miscellaneous publications
kp	Periodicals
kpa	General literary, political, etc.
kpc	General scientific
kpg	Geographical
kpp	Popular
kps	Scientific
kr	Library economy relating to geographical materials
krc	Classification and cataloging of literature, maps, etc.
krd	Classification
kre	Cataloging
krg	Physical care of maps, atlases, etc.
krj	Filing
krje	Filing equipment
krk	Preservation
krkb	Preservatives, waterproofing, etc.
krkh	Effect of air conditions, humidity, dust
krm	Repair and mounting
krmc	Processes
krmf	Materials
krmh	Paste
kro	Folding of maps; patent methods, etc.
ks	Publishers of geographical literature, maps, etc.
ku	Biographies of geographers, explorers, etc.
n	HISTORY OF GEOGRAPHY (In general, publications dealing with the period before 1800 only are classified under *n*. On cards for publications on the history of geography since 1800, notations beginning with *n* are usually placed in parentheses after the notation for the main topic dealt with and filed accordingly)
nb	Geographical knowledge of primitive peoples
nd	Geographical knowledge of ancient civilizations of the Orient Chinese, Hindus, Assyrians, Persians, etc. to 600 A. D.)
nf	Geographical knowledge of ancient Egyptians (to Alexander's conquest of Egypt, 333 B. C.)

Notation	*Subject*
nh	Geographical knowledge of ancient Carthaginians, Greeks and Romans (to 150 A. D. including Ptolemy)
nk	Geographical knowledge of Moslems and other Oriental peoples (600 A. D.–1800 A. D.)
nm	Geographical knowledge of Western Europeans and Christians (150 A. D.–1300 A. D. (Includes Christians of the Near East)
nn	Geographical knowledge of Western Europeans and Christians (1300–1600)
np	Geographical knowledge of Western Europeans and Christians (1600–1800)
nr	Geographical knowledge of Western Europeans and Christians (1800 to date)
nrg	Before 1850
nrj	1850–1900
nrk	1900–1910
nrm	1910–
p	HISTORY (when placed in parentheses after another topic, *p* indicates an historical study of the subject, *e.g., cbh* (*pk*) would be a study of the history of a volcano, or volcanoes in the nineteenth century).
pa	Discussions of the relations of geography and history (see also *eab*)
pb	Pre-history
pd	B. C.
pf	Birth of Christ to 750 A. D.
pg	750–1500 A. D.
ph	1500–1650
pj	1650–1800
pk	19th century
pka	1800–1850
pkd	1850–1900
pm	20th century
pma	1900–1914
pmb	1914–1920
pmc	1920 to date

APPENDIX II

CLASSIFICATION: AREAS

FIRST SUMMARY: CONTINENTS, ETC.

Notation	*Area*
000	The Universe (astronomic charts; solar system, etc.)
100	World (and larger parts)
200, 300	Europe
400	Asia
500	Africa
600	North America (area as a whole; and parts *exclusive* of Mexico, Central America, and the West Indies)
700	Latin America (Mexico, Central America, West Indies, and South America, *inclusive* of European colonies and possessions)
800	Australia and New Zealand
900	Oceans (including islands therein not adjacent to the mainland)

SECOND SUMMARY: COUNTRIES, DOMINIONS AND COLONIES, ETC.

100	WORLD (and larger parts)
101–109	Portions of two hemispheres
101	British empire
102	Netherlands and possessions
103	France and possessions
104	Germany and possessions (–1919)
106	U. S. A. and possessions
110	Eastern hemisphere
112	Eurasia
115	Europe and Africa
116	Asia and Africa
120	Western hemisphere
122	North, Central and South America, and the Caribbean (*not* the entire western hemisphere, including New Zealand, etc.)
130	Northern hemisphere
140	Southern hemisphere
150	Land and water hemispheres
152	Land hemisphere
154	Water hemisphere
160	Tropic regions; "torrid zone"
165	Temperate zones
170	Polar regions; "frigid zones"
171	North polar region; Arctic Sea
177	Greenland
180	South polar region; Antarctica

Notation	*Area*
200	EUROPE
201	Continental Europe
202	Northern Europe
202.1	North Sea
202.3	Northwestern Europe
202.5	Northeastern Europe
203	Western Europe
203.8	Carolingian empire
204	Central Europe
204.3	The Alps
204.4	Holy Roman empire
205	Eastern Europe
206	Southern Europe
206.3	Southwestern Europe
206.5	Southeastern Europe; Danube River
207	Mediterranean Sea; Mediterranean lands (including Northern Africa and part of the Near East)
209	Malta
210	British Isles
210.2	Great Britain (England, Wales, and Scotland)
211	England and Wales; England
220	Wales
221	Scotland
223	Ireland (entire); Irish Free State
224	Northern Ireland
225	Scandinavia and Iceland
226	Norway
227	Sweden
228	Denmark
228.8	Faroe Islands
229	Iceland
230	The Low countries and Luxemburg
232	The Netherlands
234	Belgium; Belgium and Luxemburg (grand duchy)
235	Luxemburg (grand duchy)
237	Switzerland
239	Liechtenstein (principality)
240	France
260	Germany
280	Austria-Hungary (–1919)
281	Austria (–1919)
282	Austria (proper, –1919); Austria (1919–)
293	Hungary (the pre-war kingdom –1919); Hungary proper before 1919)
294	Hungary (Hungary as of 1919– ; Central Hungary, same general area, –1919)
296	Bosnia and Herzegovina (–1919)
300	Czechoslovakia
308	Danzig

Notation	*Area*
310	Poland
320	U. S. S. R.; Russian empire
321	European part of U. S. S. R.; European Russia
330	Baltic Sea
331	Baltic states
332	Estonia
333	Latvia
334	Lithuania
335	Finland
340	Iberian peninsula
341	Spain
347	Gibraltar
348	Portugal
350	Italy
370	Balkan states
372	Yugoslavia
373	Serbia (–1919)
374	Montenegro (–1919)
376	Rumania
382	Bulgaria
383	Macedonia
384	Albania
385	Greece
386	Aegean Sea; islands of the Aegean
390	Turkey in Europe; Turkish Eurasia (Ottoman Empire) before 1912
400	ASIA
402	Northern Asia
403	Western Asia (For southwestern Asia see 410, the Near East)
404	Central Asia
405	Eastern Asia; the Far East
406	Southern Asia
406.5	Southeastern Asia
410	Nearer Asia; the Near East
411	Turkey (entire, 1912–); Turkey in Asia; Anatolia; Asia Minor
412	Cyprus
413	Syria and the Lebanon; Syria; The Levant States
414	Palestine and Trans-Jordan; Palestine; The Holy Land
414.5	Trans-Jordan
415	Arabia
417	Iraq
418	Iran (Persia)
419	Afghanistan
420	U. S. S. R. in Asia; Russian Asia
430	Japanese empire
431	Japan proper

Notation	*Area*
432	Karafuto (Japanese Sakhalin)
433	Chosen (Korea)
435	Taiwan (Formosa)
440	China (with dependencies)
441	China proper
447	Manchuria
448	Outer provinces
448.2	Mongolia
448.4	Sinkiang (Chinese Turkistan)
448.6	Tibet
450	India; British India
450.2	French India
450.4	Portuguese India
457	Burma
458	Nepal and Bhutan
459	Ceylon
460	Indochina and Malay peninsula; Farther India
461	French Indochina
462	Siam
463	British Malaya
464	Straits Settlements
465	Federated Malay States
466	Unfederated Malay States
470	Malay archipelago (including Philippine Islands); East Indies
471	Netherlands Indies ("Dutch East Indies")
480	Philippine Islands
500	AFRICA
502	Northern Africa; Mediterranean Africa (See also 207 Mediterranean lands)
502.1	The Sahara
502.2	The Sudan
503	Western Africa
504	Central Africa
505	Eastern Africa
510	Northwestern Africa; Barbary states; Atlas Countries
513	Morocco
514	Tangier (International zone)
515	Spanish Morocco
516	French Morocco
517	Algeria
518	Tunisia
519	Libya (Libia Italiana)
519.3	Tripolitania
519.5	Cirenaica
520	Northeastern Africa; Nile basin
521	Egypt
526	Anglo-Egyptian Sudan
530	Niger-Gambia area (including French West Africa)

Notation	*Area*
531	Rio de Oro
532	Gambia
533	Portuguese Guinea
534	Sierra Leone
535	Liberia
536	Gold Coast
536.5	British Togo (mandated territory)
537	Togo (former German Togoland)
537.5	Togo (French mandate)
538	Nigeria
540	French West Africa
550	Cunene-Chad area
552	Kamerun or Cameroons (former German territory)
552.3	Cameroons under British mandate
552.4	Cameroun under French mandate
553	Spanish territory on the Gulf of Guinea
553.4	Rio Muni (Spanish Guinea)
554	French Equatorial Africa
555	Belgian Congo
556	Ruanda-Urundi (mandated territory)
557	Angola (Portuguese West Africa)
558	Kabinda
560	Somaliland-Tanganyika area
561	Eritrea-Ethiopia-Somaliland area
562	Eritrea
563	Ethiopia (Abyssinia)
564	Somaliland
564.2	French Somaliland (French Somali Coast)
564.3	British Somaliland
564.4	Italian Somalia
565	British East Africa
566	Kenya (former Brit. E. Africa protectorate)
567	Uganda
568	Tanganyika Territory (former German East Africa)
569	Islands near Somaliland-Tanganyika area
569.2	Zanzibar and Pemba; Zanzibar
569.3	Pemba
569.4	Socotra
570	South Africa
570.1	British South Africa
571	Union of South Africa
572	Cape of Good Hope Province
573	Orange Free State
574	Natal
575	Transvaal
576	Rhodesia
576.2	Northern Rhodesia
576.6	Southern Rhodesia
577	Other British South Africa

Notation	*Area*
577.2	Basutoland
577.3	Swaziland
577.4	Bechuanaland protectorate
577.5	Nyasaland
578	Southwest Africa (mandated territory, former German South-West Africa)
579	Mozambique (Portuguese East Africa)
580	Madagascar and neighboring islands; Madagascar
583	Comoro Islands
584	Amirante Islands
585	Réunion
586	Mauritius
587	Seychelles
590	West African Islands
592	Cape Verde Islands
594	São Thome (St. Thomas)
595	Principe
596	St. Helena
600	NORTH AMERICA (as a whole; and parts north of Mexico)
601	Eastern North America
602	Northern North America (Canada and part of the U. S.)
603	Western North America
604	Southern North America
605	Alaska
610	Canada; Canada and Newfoundland
620	Newfoundland, Labrador, French islands, St. Lawrence river and gulf, and the Great Lakes
621	Newfoundland; Newfoundland and Labrador
622	Labrador
623	St. Pierre and Miquelon
624	Great Lakes–St. Lawrence system
630	United States of America
632	Northern United States
632.3	Northwestern U. S. (approximately the northwestern quarter)
632.5	Northeastern U. S. (approximately the northeastern quarter)
633	Western U. S. (approximately the United States west of the Mississippi River)
633.2	Pacific Northwest
633.4	Mountain (*Census area*: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada)
633.6	Southwest
634	Central U. S.
634.4	West North Central (*Census area:* Minnesota, Iowa, Missouri, N. Dakota, S. Dakota, Nebraska, Kansas)
635	Eastern U. S. (approximately the U. S. east of the Mississippi River or smaller areas)

Notation	*Area*
635.2	Atlantic states; The Thirteen Colonies
636	Southern U. S.
636.5	Southeastern U. S.
640	New England & Middle Atlantic States
640.1	New England (viz., Me., N. H., Vt., Mass., R. I., Conn.)
640.2	Middle Atlantic (viz., N. Y., N. J., Pa.)
641	Maine
642	New Hampshire
643	Vermont
644	Massachusetts
645	Rhode Island
646	Connecticut
647	New York
648	New Jersey
649	Pennsylvania
650	South Atlantic States
651	Delaware
652	Maryland
653	District of Columbia
654	Virginia
655	West Virginia
656	North Carolina
657	South Carolina
658	Georgia
659	Florida
660	South Central States
660.1	East South Central States (*Census area:* Ky., Tenn., Ala., Miss.)
660.2	West South Central States (*Census area:* Ark., La., Okla., Tex.)
661	Kentucky
662	Tennessee
663	Alabama
664	Mississippi
665	Arkansas
666	Louisiana
667	Oklahoma
668	Texas
670	North Central or Lake States
671	East North Central States (*Census area:* Ohio., Ind., Ill., Mich., & Wis.)
672	Ohio
673	Indiana
674	Illinois
675	Michigan
676	Wisconsin
677	Minnesota
678	Iowa
679	Missouri

Notation	*Area*
680	Great Plains and Rockies States
681	North Dakota
682	South Dakota
683	Nebraska
684	Kansas
685	Montana
686	Wyoming
687	Colorado
688	New Mexico
690	Great Basin and Pacific States
691	Great Basin
692	Idaho
693	Utah
694	Arizona
695	Nevada
696	Pacific States (*Census area:* Wash., Ore., Calif.)
697	Washington
698	Oregon
699	California
700	LATIN AMERICA
701	Gulf and Caribbean lands
702	Mexico
710	Central America
711	Guatemala
712	British Honduras
713	Honduras
714	El Salvador
715	Nicaragua
716	Costa Rica
717	Panama
718	Panama Canal Zone
720	West Indies and the Bermudas
721	Bahama Islands
722	Greater Antilles
723	Cuba
724	Hispaniola (Haiti and the Dominican Republic)
725	Haiti
726	Dominican Republic
727	Jamaica
728	Puerto Rico
729	Lesser Antilles
730	Leeward Islands
731	Virgin Islands (Br. & U. S.)
732	British Leeward Is.
733	French Leeward Islands
734	Martinique
735	Windward Islands
736	Barbados
737	Trinidad and Tobago

Notation	*Area*
738	Curaçao and other Dutch islands in West Indies
739	Bermuda Islands
740	South America
742	Northern South America (northern half)
743	Western South America
744	Central South America
744.5	Gran Chaco; Chaco Boreal
745	Eastern South America
750	North coast countries
752	Colombia
753	Venezuela
754	The Guianas
755	British Guiana
756	Netherlands Guiana (Surinam)
757	French Guiana
760	West Coast countries
762	Ecuador
764	Peru
766	Bolivia
770	Brazil
780	Southern South America
782	Chile
784	Argentina
786	Uruguay
787	Paraguay
788	Falkland islands
800	AUSTRALIA and NEW ZEALAND; Australia, New Zealand and Melanesia
810	Australia
830	New Zealand
900	OCEANS (Arctic Sea under 171; Mediterranean Sea under 207; inland seas under appropriate land areas)
910	Pacific Ocean
912	Northern Pacific
913	Western Pacific
914	Central Pacific
915	Eastern Pacific
916	Southern Pacific
920	Melanesia
921	New Guinea (entire island)
921.1	Netherland New Guinea
921.4	Papua Territory (Australian New Guinea)
921.7	Australian mandated territory of New Guinea (former German New Guinea)
922	Bismarck (New Britain) archipelago
923	Louisiade archipelago
924	Solomon Islands

Notation	*Area*
925	Santa Cruz Islands
926	New Hebrides
927	Loyalty Islands
928	New Caledonia
930	Micronesia
931	Fiji Islands
932	Tonga or Friendly Islands
933	Samoa
933.2	American Samoa
933.4	New Zealand Samoa (formerly German Samoa)
934	Gilbert and Ellice Islands; Gilbert Islands
935	Ellice Islands or Lagunes
936	Japanese Micronesia; Pacific islands under Japanese mandate
936.2	Marshall Islands
936.3	Caroline Islands
936.35	Yap
936.4	Pelew Islands
936.5	Marianne or Ladrone Islands
937	Guam
940	Polynesia; Southern Polynesian groups
942	Cook or Hervey Islands
943	Austral or Tubuai Islands
944	Society Islands
945	Tahiti
948	Tuamotu, Paumotu, or Low archipelago
950	Scattered Polynesian Islands
952	Central Polynesian Sporades
952.2	Howland Island and Baker Island
952.3	Palmyra Island
952.4	Washington Island
952.5	Fanning Island
952.6	Christmas Island
952.7	Jarvis Island
952.8	Malden Island
952.9	Starbuck Island
954	Phoenix Islands
955	Tokelau or Union Islands
956	Marquesas or Mandana Islands
958	Pitcairn Island
960	Hawaiian Islands
970	Eastern Pacific Islands
972	Easter Island
973	Sala-y-Gomez Island
974	Juan Fernandez Islands
976	Galápagos Islands
978	Clipperton Island (Pasión)
980	Atlantic Ocean
990	Indian Ocean

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WILLIAM HERBERT HOBBS.

Discovery and Exploration within the Arctic Region.

(Presidential Address. Published in full in the issue of March, 1937.)

EDWARD A. ACKERMAN. (Introduced by Derwent Whittlesey.)

Contrasted Regions within the Central Massif.

The western slope of the French Central Massif can be divided into two sections, Limousin on the north, and the Causses region of Perigord and Quercy on the south. The two regions lie across a dissected plateau, inclined from the Massif highlands on the east to the lower areas in the west. Upland surfaces are comparatively level, and relief within the area nowhere exceeds six hundred feet. Both regions have a mild, humid climate, showing a pronounced marine influence.

Streams are abundant on the western side of the Massif, flowing from east to west. Communication routes following down the valleys relate both regions to the Aquitanian lowland. The exterior focus of both is thus a populous district of varied activity, while the rural populations of the upland regions themselves are sparse.

The well-watered upland of Limousin to the north supports widespread groves of chestnut trees, year-'round pastures, and most of the cultivation of the region, but on the equally rainy Causses upland there are only sparsely sown scrub oaks, stunted shrubs, rare grasses, and little cultivation. On the other hand the valleys which penetrate the Causses are intensively cultivated, whereas there is scarcely a farm in the Limousin valleys. Both regions export agricultural products, but one sends out animals, the other vegetables and fruits. Many cattle graze in the north, while only a few sheep and goats browse on the southern uplands. The farming population is disseminated in the northern region, but in the southern one it is grouped in villages which tend to cluster about the mouths of tributary valleys. Towns are on the upland in Limousin; in the valleys in Quercy-Perigord.

Stone houses are the rule in both sections, but a definite feeling for architecture and sculpture is shown in the south. In Limousin, however, construction is crude, elemental, and undecorated.

All the dissimilarities between the two adjacent regions are related to a difference in the underlying rock—crystallines in Limousin, very permeable limestone in the Causses. Natural vegetation and crops do better on the

infertile granitic soils than on the dry, denuded limestone. The narrow V-shaped valleys in the granites give no footing for farms, but with clear water and power locate series of small factories, while the broad limestone valley floors afford by far the best farm land of both regions. The limestone valleys are rich farming oases in an arid, scantily populated region; the granitic gorges locate nuclei of industry and people within an infertile, but generally farmed upland.

WALLACE W. ATWOOD.

The Recognition of Erosion Surfaces in Rugged Mountain Regions.

The principles of stream erosion which have been worked out with great care by certain of the illustrious members of our Association have usually been directly applied by them to regions of slight relief, and very commonly they have assumed a plain with a gentle seaward slope in which gulleys grew headward through ravine-hood to valley-hood, and finally to old age. Their analyses of the problem have been illustrated by simple diagrams, in which it was clear that they had in mind lowland plains, or low domal areas.

In an effort to apply those principles in the interpretation of the evolution of topography in rugged mountain regions many serious errors have been made. Numerous cycles of erosion have been postulated because benches, spurs, meander scars, temporary base plains, and correspondence in elevation of certain peaks all require explanation. Such features do not always mean new cycles. The errors are due chiefly to the failure to recognize the complexities in the problem due to geologic structures, variations in rock resistance, differences in the base plain of erosion to which different streams were cutting, stream piracy, variations in the nature and amount of uplift during succeeding periods of mountain growth, to the burial and resurrection of mountain ranges, or to factors that have local significance only. Some of the errors are due to the failure to recognize that at any given moment in the erosion of a great land mass there may be present peneplained areas, wide zones or belts in a mature stage of erosion, and other portions of the landscape in the youthful stage. These, with all their variations, belong to one cycle. There is great complexity in the topography of a rugged mountain region at all stages preceding the final base plain of erosion.

After twenty-five years of field study in such rugged regions I shall endeavor to present the kind of evidence which proves to be helpful in recognizing the youthful, mature, and old age erosion surfaces, peneplains, resurrected erosion surfaces, and topographies in which there is a gradation through youth to old age. I shall endeavor also to point out some of the difficulties that have led many astray.

WALLACE W. ATWOOD AND WALLACE W. ATWOOD, JR.

The Physiographic Evolution of the Rocky Mountain Region.

During the last field season our studies reached a stage which justifies the formulation of a working hypothesis which will set forth the sequence of major events that have punctuated the physical history of the Rocky Mountain region. The ranges were formed during a mighty revolution at the close of the Mesozoic era. During a part of Eocene time there was a bold rugged mountain landscape in many sections of this province, but by the close of the Eocene period large areas had been reduced and local old-age erosion surfaces were developed.

Late in Eocene time there was another period of uplift in the Rocky Mountain region. The ranges were reemphasized and the intermontane basins were somewhat clearly defined. There followed a long mid-Tertiary period of denudation in the mountains and of filling in the basins. There was considerable wash which extended from the mountains eastward over the Great Plains, and westward over the High Plateau regions of Utah and Arizona. Before Pliocene time had far advanced the landscape in the Rocky Mountain region consisted of a few low ranges of mountains, many broad areas that had been reduced to a peneplain, and extensive lands that were mantled with alluvium.

Late in Tertiary time there was a widespread, general uplift of the whole province and of the neighboring physiographic provinces. At this time there may have been some reemphasis of the mountains, but no pronounced folding or faulting. The uplift caused rejuvenation of streams, and many that were flowing directly over buried mountain ranges were forced, as they lowered their channels, to cut into the mountain structures. These superimposed streams developed magnificent water gaps and gorges. As erosion continued more and more of the mid-Tertiary filling was carried away, and the mountain ranges came to stand out with bold relief.

The dissection of the widespread Rocky Mountain peneplain of late Tertiary age and the cutting of modern canyons followed and has continued to the present day. The part played by glacial ice in the early part of Tertiary time and during at least three stages in the Pleistocene period is incorporated in the hypothesis.

WALLACE W. ATWOOD, JR.

The Major Canyons of the Rocky Mountain Region and their Significance to the Physiographer.

Following the development of a widespread peneplain in late Tertiary time, uplift occurred throughout the Rocky Mountain region. Streams which once wandered sluggishly across an old-age landscape were forced to cut their channels deep into the underlying structures. In places soft rocks

were encountered and consequently large areas were rapidly dissected and broad valleys produced. Elsewhere the superimposed streams uncovered buried mountain ranges and cut deep canyons into the resistant formations. The North Platte carved four important gorges in Wyoming alone; the Bighorn produced three; while the Green, Sweetwater, Shoshone, Laramie, Gunnison and Rio Grande Rivers all cut one or more in the Rocky Mountain region. In each case canyon cutting was inaugurated with the uplift late in the Tertiary.

The present paper deals with the geologic and physiographic evidence upon which the age of canyon cutting has been determined. Over a score of canyons have been studied. The establishment of the age relationship has produced one of the most reliable punctuation marks in the physiographic history of the Rocky Mountain region.

CLARENCE E. BATSCHELET.

Criteria for Delimiting Unincorporated Areas.

The need of population figures for unincorporated communities in the United States is recognized, but, as unincorporated communities have no definite limits, it is difficult to secure these figures.

Two methods may be followed in determining the limits of unincorporated areas: (1) have enumerators determine the population to be counted in the unincorporated communities, either from their own personal information or from information furnished by individuals residing in these communities; or, (2) have the Bureau of the Census determine the limits of the unincorporated communities, (a) either in advance of the enumeration, from available information and field work, or, (b) after the enumeration is completed, by so planning the census that the necessary information to delimit these areas will be secured.

At the Census of 1930 the enumerators were instructed to report separately the returns for specified unincorporated communities, but, in many instances, these instructions were not followed and, even where the population was reported separately, it was not possible to determine the limits of the areas to which the population returns related. This would clearly indicate that the same method should not again be followed without material modifications.

If the second method is adopted, and the limits determined in advance of the census, it would be necessary to send men into the field, plat the unincorporated areas, define their limits, and make separate enumeration districts for these areas. This procedure would be slow and expensive and the necessary specifications would be difficult to prepare.

If the limits are determined after the enumeration is completed, the Bureau must furnish each enumerator with a large-scale road map upon

which he would spot the location of each dwelling and enter adjacent thereto a number which would correspond to the number of family in order of visitation as shown upon the schedule. In thickly settled communities, only the location of the dwellings would be indicated. Suitable county maps do not exist for the entire country, but many good county road maps are available. This plan will not only enable the Bureau to give the population of the unincorporated communities but, in addition, will assist the enumerators in making their canvass; permit a ready check of the completeness of the enumeration; verify the boundaries of the minor civil divisions; and provide basic date for the selection of areas for sampling, as provided for in the proposed Buchanan Bill, for the compilation of a population density map of the United States, the preparation of isopleth maps, and the delimiting of marketing areas in rural sections.

W. O. BLANCHARD.

A Geographical Atlas of Illinois.

An exhibit of maps from a geographic atlas of Illinois scheduled for publication in the late summer of 1937. As planned the volume will present by means of maps, graphs and a minimum of text, the (1) fundamental environmental conditions, (2) important natural resources, (3) exploitation of those resources, and (4) problems of conservation and civic-control involved in their future development.

The work is being sponsored by the State of Illinois, the State Geological Survey, and the Chicago Geographical Society. The material is being contributed by a score or more of geographers and of scientists in allied fields.

DAVID I. BLUMENSTOCK. (Introduced by John B. Leighly.)

Geography and Primitive Culture Patterns in the Southern Sierra Nevada.

The area under consideration extends approximately from Tehachapi Pass north to Kings River, and from the western side of the San Joaquin Valley eastward to the Panamint Range. Specifically, it includes, as of the 1870's, the area in which lived twenty-three Indian tribes of Yokuts and Shoshonean linguistic groups.

The objective of this survey was to show diffusion and trade affinities and their geographic relationships in the area. This was done by comparing cultural and environmental distributions, thus establishing a sound basis for the precise identification of trade articles as well as determining to what extent the environment has prohibited—either in fact or potentially—the diffusion of culture traits.

There were available to start with data giving the distribution of 2,234 culture elements as they existed among the twenty-three groups. It was

found that 24.5% of these traits was directly dependent for their existence on the presence of at least one factor in the natural environment. If an element was found in an area in which the environment eliminated the possibility of its being indigenous, it was recorded as a trade element.

A comparison of the total distribution of elements with the distribution obtained when environmental influences were held constant showed the diffusion relationships with all environmental barriers eliminated. It was thus possible to demonstrate that in this area the break in genetic association occurred not along the crest of the Sierras, but rather along the middle of the San Joaquin Valley, and that the desert tribes to the east were more closely associated with the mountain groups than has heretofore been recognized.

S. WHITTEMORE BOGGS.

Notes on Certain Problems in the Definition of Water Boundaries.

Political boundaries which pass through bodies of water within the territory of two or more nations or states present a number of problems. Generally speaking, it is not feasible to mark the turning points of water boundaries, either in the water or by means of reference monuments and lights on land. Furthermore, vessels on large lakes are sometimes out of sight of land; therefore if a question of national or state jurisdiction arises it should be practicable to plot the vessel's position, at the moment concerned, on a chart on which the boundary is shown, or on which it is feasible to determine the boundary in accordance with a clear and precise definition.

Water boundaries, in lakes, straits and rivers, generally follow either one shore, the median line (a concept relating to the horizontal plane), the navigable channel or thalweg (a concept relating to the vertical cross-section), or an arbitrary geometrical line such as a parallel of latitude or an azimuth line. The term "median line" as applied to water boundaries has not as yet been clearly defined, and several concepts have been proposed.

There appears to be but one definition to which only one conforming line may be drawn on the chart—once there is agreement regarding the definition of the shores, by stage of the water, and agreement as to the course or the principle to be followed when there are islands. As a precise definition is desirable, it is suggested that the median line should be invariably understood to be the line every point of which is equidistant from the nearest points on opposite shores or banks.

The Great Lakes afford examples, the international boundary having first been defined as the middle of the lakes, and subsequently defined and indicated on official charts as a series of straight lines approximating the median line. Lake Michigan affords an example as the boundary of Michigan with both Wisconsin and Illinois.

Another type of water boundary problem relates to the boundary between two nations or states, extending from the coast through territorial waters to the high sea. Treaties, awards and laws sometimes omit to define these boundaries, the lines as defined terminating at the coast. Some authors propose that the water boundary should constitute a prolongation of the last course of the land boundary; it may not have been observed, however, that this method would in many instances assign to one state territorial waters which are more than three nautical miles from its own shores and less than three miles from the shore of its neighbor.

As a precise definition of general application it is suggested that the seaward terminus should be the point which is three nautical miles from the nearest land of the two states, and that, if there be no island complications, the boundary constitute a straight line from the land terminus to that point on the high sea. If there are islands it would seem that the water boundary should be a median line between the mainland and island territories of the two states, likewise terminating on the high sea at the intersection of the three-mile limits of the two states.

ADELBERT K. BOTTS. (Introduced by C. W. Thornthwaite.)

Drought and Air Masses.

This paper compares air mass and rainfall conditions for the middle west during a season of normal rainfall with those conditions during a year of severe drought. The periods May 21 to July 15 inclusive (eight weeks) for the years 1935 and 1936 were investigated. Cities within the 1936 drought area received approximately normal rainfall during the period in 1935. Each of them received less than 50% of normal during the corresponding 1936 period.

The maps constructed for this study indicate the distribution of the principal air mass types over the United States. Comparing the two Polar continental (Pc) maps it appears that for most of the drought area this type of air mass was more frequent in 1936 than in 1935. Pc air occupied the midwest more frequently during the dry year than during the normal one.

The frequency of the other major polar air mass type, Polar Pacific (Pp) was greater during the normal year than during the dry one.

The distribution of Tropical Marine (Tm) air masses is surprisingly similar during the two periods studied. Each station had practically as many days of Tm air in 1936 as in 1935 and Oklahoma City had more. Accepting the demonstrated fact that Tm air masses are the most humid ones affecting central United States it appears from these maps that the atmosphere contained practically as much moisture in the summer of 1936 as in the summer of 1935. Examination of daily observations of specific

humidity at Omaha, Nebraska, furnishes additional verification for that belief. Except at the two lowest levels the specific humidity for Omaha in 1936 was higher than in 1935. The evidence precludes the assumption that drought conditions of the past summer resulted from lack of moisture in the atmosphere. The moisture was there. The mechanism necessary for changing it to rainfall was lacking.

CHARLES F. BROOKS.

Certain Meteorological Aspects of Floods.

Great floods can occur only with excessive rainfall from great masses of moist tropical air. The rapid melting of snow which is involved at times is also due to tropical winds. The warmth of the raindrops is inconsequential as a melter of snow; even sunshine is of minor potency for the production of snow flood waters. The main melters are the heat conduction from the wind and the latent heat of condensation of vapor out of the wind. This condensation also adds new water.

When snow is on the ground, dense forests greatly reduce the snow-water contribution to a flood. Less snow has reached the ground; the ground has not frozen so deeply if at all; the trees shut out the melting sunshine and wind; the snow can "absorb" much rain water and greatly delay its runoff.

The flow of moist tropical air over the countryside is in itself not sufficient to produce flooding rains. Such air, however, is conditionally unstable and will overturn to great heights if it is elevated even a small distance—enough to initiate condensation. The elevation of the air mass may be caused by obstructing highlands, or a colder air mass, or both. Even a moderate highland, such as the plateau of western New York, may by holding the front of a slowly moving colder air mass, greatly magnify the apparent topographic control of the distribution of flooding. The banking up of a cold air mass behind a mountain range may also lead to such anomalies as excessive precipitation on the lee side of the mountains.

The great floods arise from repetitions of a certain pattern dominated by widespread conditions, or from the slow movement of an excessive rain producing condition.

The distribution of maximum intensities of rainfall must remain very patchy until records of well over 100 years are available. Nevertheless, the samples observed here and there can be weighed as to their geographic representativeness by considering the causes and the limits to which such causes might operate to such an intensity. Thus maximum rains from stalled fronts on a plain, as in Ohio in 1913, might be considered as representative of what might occur anywhere from Ohio and Kentucky westward to Mis-

souri and possibly eastern Kansas, equally flat regions more or less equally exposed to invasions of moist tropical air masses and conflicting polar masses. On the other hand, the flooding rains in Arkansas and eastern Oklahoma in 1927, and the 1927, 1935 and 1936 floods in the Appalachian region, were fairly definitely related to the highlands, which either stalled the cold fronts or upthrust the tropical air masses. These maximum rains could not be projected over the neighboring lowlands as representative possibilities.

GEORGE B. CRESSEY.

Tungchow and Shatin, Two Chinese Communities.

Tungchow and Shatin are two Chinese communities which serve to illustrate the geographic contrasts between the North and the South. Tungchow lies a dozen miles east of Peiping on the broad dry North China Plain, while Shatin is six miles north of Hongkong amid the humid Hills of Liangkwang. Whereas Tungchow raises corn, kaoliang, beans, wheat and millet without irrigation, Shatin depends predominantly on two crops of rice, both irrigated.

Tungchow is the 'port' of Peiping, on the west bank of the Peiyun Ho at the head of navigation above Tientsin. Here the tribute junks bringing rice from the Yangtze Valley over the Grand Canal transferred their cargoes to carts for delivery to the Imperial Granaries. The city dates back to the Han dynasty, twenty centuries ago, and has been an important garrison town until recently. The town is now in political and economic decline. The surrounding countryside is prosperous, with most of the land owned by the farmers. Despite the proximity to Peiping, there is no truck gardening, as the distance is too great for wheelbarrows, and rail transport is too expensive. Corn is the chief crop, and corn meal the principal food. Winter wheat is sold to the townspeople, while kaoliang and some of the beans are fed to chickens, pigs, and draft animals.

Shatin lies at the alluvial filled head of a deep bay in the Kowloon Leased Territory. Hills of decomposed granite rise to over a thousand feet, and these non-agricultural land forms occupy three-fourths of the area. The hills are everywhere green, but repeated and premature cutting has reduced the forest cover to local patches. Rice covers over ninety per cent of the cultivated area, with one crop from March to June, and another from July to October. Most fields lie fallow during the winter. The proximity to Hongkong introduces a suburban element with a few score homes of commuters on the hillsides.

CHARLES M. DAVIS. (Introduced by K. C. McMurry.)

Land Utilization in North Park, Colorado.

In these days of much discussion of planned economies and planned land use it is interesting to find in North Park, a basin of the Colorado Rocky

Mountains, an area of limited resources in which has been developed by the old method of trial and error, a stable economy, so simple, clear cut and well adjusted to the terrain that one might think that it had been developed along a predetermined scheme.

This is an area wherein nature has provided little in terms of the necessities for crop production. There is a scanty rainfall and a short growing season with constant danger of frost except in the months of July and August. The lack of precipitation is somewhat compensated for by a large number of streams, originating in the melting snow of the surrounding mountains and providing irrigation water for native hay grasses in the bottom lands.

At various seasons all of the land types in the Park play their roles in the grazing. When the hay meadows have produced their summer crop they are ready for use as winter pastures. The mountain slopes are the summer ranges for the cattle and the higher alpine meadows are especially suitable for sheep. The sagebrush uplands of large area but low carrying capacity hold the animals in the spring after the water is turned on the meadows and before the highland pastures are free from snow, and again in the fall for as long as possible to conserve the limited amount of hay available for winter feeding.

The trends in land use during the last eighteen years seem to show that the ranching economy has adjusted itself both in extent and practice to the possibilities of its physical setting. The number of cattle exhibits some fluctuation, perhaps connected with the economic cycle, and with a general tendency toward decline. The number of sheep, on the contrary, has risen rapidly. According to ranchers this is occasioned by the fact that sheep represent a "one year crop," that is, the lambs may be sold in the year they are born, thus avoiding water feeding. The area of the hay lands has shown only negligible fluctuation over the period of record and appear to have been developed to their fullest extent and are the limiting factor to the expansion of the livestock economy. The sagebrush pastures are not worth owning by themselves and more than half of their area has never been patented as private land. Most of the surrounding mountain slopes are controlled by the National Forests, but the footland is so much more productive of grass than the heavily forested upper slopes that only about one-fourth of the cattle find their summer range within the limits of the National Forests.

W. Elmer Ekblaw.

The Significance of Soils Geography.

The rapid development of Soils Science during the quarter century just passed has placed in the hands of the geographer a new means of interpreting local and regional relationships, of which he has not yet fully availed himself.

Soils interest the geographer from two points of view: (1) the part that they themselves play in the composition of the variegated pattern of man's occupancy and use of the land; and (2) the part that they play in expressing, or reflecting, wellnigh the whole complex of geographic factors as they affect the land and the landscape upon it, including man's occupancy.

Because soils have not the power of organic adaptation, nor the quality of mobility, nor the gift of volition, they differ in their character and distribution only as other factors operate upon them. Land form, drainage, and slope are closely related to geologic history; climate is primarily consequent upon solar radiation; soils only are a purely autochthonous product of local factors.

A classification of soils presented graphically upon a map, should thus most nearly reveal, or express, the resultant of all factors that affect the land of any given place or region, and the character of its use.

ERIC H. FAIGLE. (Introduced by Robert B. Hall.)

Some Aspects of the Urban Geography of Syracuse.

This paper will attempt to set forth the various influences which have combined to form the city of Syracuse, both as regards its wider regional relationships and as regards the intimate adjustments of its internal design to the features of the local terrain. The most important factor in the development of the city has been its central location which in the beginning overcame the obstacles of poor site. The convergence of transportation routes on the site and the development of the salt industry, which was made possible by these transportation facilities, were the two circumstances which had the greatest effect in transforming the village into a city.

Since its settlement in 1804, the growth of Syracuse has been steady but not spectacular. The early roads and canals have been replaced by highways and railroads and the salt industry has been gradually transformed into a varied pattern of industries the products of which represent Syracuse in the markets of the world. The area of the city has been increased by annexation from 250 acres to 16,417.65 acres and the population has grown to 209,326 making the city the fourth largest in New York State.

Today Syracuse is a hub city not only because of its central location but because it is a focal point from which radiate commercial, industrial, cultural, recreational, and administrative functions. The transportation facilities, industrial, and commercial areas utilize the level lands of Onondaga Valley and the Lake Plains. The recreational, cultural, and residence areas for the most part are located on the plateau front and valley sides. The city as a whole represents a compact mass of urban agglomeration. Within its area lie many problems of city planning; whereas, most of these problems are

beyond the scope of this paper, it is hoped that the data and maps here presented will provide the very necessary foundation on which adequate planning can be based.

J. SULLIVAN GIBSON. (Introduced by W. Elmer Ekblaw.)

The Soils Factor in the Character of Land Use in the Tennessee Valley.

The soils of the Tennessee Valley are relatively complex. The intermingling and blending of members of Gray-Brown Podzolics, Red, and Yellow soil groups harmonize with the region's humid mesothermal climate and its intermediate location between northern Podzols and southern Lateritic soil groups.

Soils in this region conform somewhat, but by no means completely, to the geologic and the physiographic features. In the upper part of the Basin, where ridge-and-valley topography dominates, soil series trend in a northeast-southwest direction characteristic of other physical grains. In areas of more uniform relief where erosion is less active, soils show less conformity to geologic conditions, and reflect more plainly the factors of drainage, climate, and vegetation.

Two factors—erosion and drainage—greatly affect soil character in this area. In many parts sheet and gully erosion has destroyed much of the land, and additional large acreages have suffered tremendous soil losses. In areas of poor drainage ground water retards profile development and greatly limits the utility of the soil. In many bottom land areas frequent flooding rejuvenates the soil by siltation, thereby enhancing its agricultural value.

The character of land utilization in this region reflects the present agricultural quality and, to a limited extent, the former care of the soils. The scale and pattern of individual farming operations correlate closely with soil characteristics. In areas of poor soil, especially where steep slope, advanced erosion, and land abuse prevail, operations are of relatively small scale, individual fields are small and irregular, and land use in general assumes a patchy pattern.

An evident relationship between farm land abandonment and soil quality holds for the region in general. Virtually none of the better soils have been withdrawn from farm use, and relatively little of such land serves other purposes than for crops and rotation pasture. Some soils which originally were fairly productive, however, have deteriorated through erosion, over-cropping, and other agencies, and now fall in the low productive or in the abandoned soil class. Soils originally of low productivity give way through depletion or erosion under continued cropping, and eventually revert to low quality pasture or to waste.

Only a few specialized crops, including tobacco and strawberries, receive much consideration in the selection of soils for their culture. Physical char-

acteristics of slope, stoniness, and drainage, however, exclude individual crops from some fields. Corn, the one pioneer crop, embraces in its acreage virtually all soil types and soil conditions found in the crop land of the region. On the other hand, wheat, which requires good drainage and relatively smooth surface, is practically absent from low lying first bottoms and from steep slopes.

LAURENCE MCK. GOULD. (Introduced by W. H. Hobbs.)

Geomorphology of the Queen Maud Mountains.

The Queen Maud Mountains form the main part of the southern boundary of Ross Sea. Structurally they are a continuation of the extensive South Victoria horst which forms the western boundary of this sea; they consist of a series of differentially but essentially vertically faulted blocks.

In spite of the heavy blanket of snow and ice which obscures most of the mountain surfaces, the major topographic features are largely an expression of the underlying rock. The main feature of the range is a series of huge tabular mountains, capped by nearly horizontal sediments, rising to heights of 14,000 feet. Flanking them on the north is an irregular fringe of low-lying ragged peaks eroded from ancient crystalline rocks. To the south lies the ice-clad polar plateau above the general level of which the mountains rise to heights as great as 5,000 feet.

Great interest lies in the glacial phenomena for here is a veritable museum of types from cirque ice to sizeable mountain glaciers which are entirely nourished from catchment basins within the mountains, to the great valley or outlet glaciers which completely pierce the mountain rampart and drain the ice from the polar plateau into Ross Shelf Ice. Among the latter are some of the longest known glaciers. These huge glacial troughs which appear to be down-faulted blocks or graben are now the only outlets for the outward moving ice from the polar plateau. Formerly when the ice was thicker only the tops of the higher western part of the range rose above the ice; great floods completely submerged the lower eastern end.

ARTHUR R. HALL. (Introduced by C. W. Thornthwaite.)

The Problem of Soil Erosion in Ante-Bellum Virginia.

The soil, one of the last natural resources to receive attention by those interested in the national conservation movement, was one of the first to be subjected to destructive exploitation. Culturally induced erosion has been a problem of considerable magnitude in the south Atlantic States since at least as early as the Revolution. This paper cites travelers' accounts, published and unpublished correspondence, farmers' periodicals, and essays of agricultural reformers to show something of the extent of soil wastage that was taking place in Virginia in the early national period. Virginia farmers

of the early nineteenth century not only deplored the existence of this problem, but attempted to "do something about it," and nearly all the soil saving devices in use in the South at the present time were experimented with and developed then. Brief mention is made of these various devices.

ROBERT B. HALL.

Tokaido Road and Region.

The Japanese people have long associated the concepts road and region. The Tokai road-region has been considered as a unit through many centuries. The road is the unifying bond of the region and every change in one has been reflected in the character of the other.

WILLIAM HERBERT HOBBS.

An Optical Phenomenon and Its Relation to the Discovery of Polar Lands.

Looming or *superior* mirage occurs not infrequently within the Polar areas, and especially over sea ice off the borders of inland ice areas. Quite in contrast to desert mirage it is due to an inversion in the atmosphere, and this occurs most frequently at elevations above sea of 200 meters and 1,215 meters. As a consequence land far below the horizon and at distances generally in excess of 200 miles is brought clearly into view. Many difficulties in explaining the location of land within the Polar regions are thus cleared up. Examples are given.

GEORGE D. HUBBARD.

Geography of the Gaspé Country.

The Gaspé country embraces two counties and most of two more in eastern Quebec between the St. Lawrence River and Chaleur Bay. Its geologic and physiographic history has been similar to those of the northern Appalachians in sedimentation, folding, faulting, erosion, and glaciation.

The north side along the river presents a continuous succession of steep headlands deeply wave-cut alternating with crescentic beaches festooned between them. The eastern end is much the same except for differences due to the shoreline cutting across the strike of folds and hard and soft layers. Occasional stacks add to the interest of the shoreline, both north and east, of which Percé is the most striking.

The south shore is the meeting of a long gentle slope with the waters of Chaleur Bay. Harbors are more numerous and more sheltered than on the north and less deep but usually deep enough.

The towns and roads are distributed with reference to the relief, topography, and shore features. Industries are responses to such resources as occur, forest products, fish, some crop possibilities, and wool from sheep.

The paper discusses the people and their characteristics, their uses of resources and soils, their race, language, religion, occupations, and the possible development of more serviceable utilization of what they have.

BERT HUDGINS. (Introduced by W. Elmer Ekblaw.)

Waterworks Intakes of the Great Lakes.

The Great Lakes furnish an unlimited supply of fresh water for domestic and industrial purposes but the borders of the lakes are contaminated with sewage and wastes from the streams tributary to the lakes, from lake port cities, and from summer resorts along the shores, as well as from pollution from passing vessels; the borders of the lakes, therefore, have a less pure water than the great body of the lakes, though winds, waves, currents, ice, and floods from streams may at times carry impure water out several miles from shore.

The logical place for locating an intake for a city water supply would be far out in the lake; but the lakes are deep, and the difficulty of the engineering project in placing an intake in more than 100 feet of water, coupled with the expense of a long water main, prohibits it. They must be placed near shore. The factors to be considered in locating waterworks intakes are rather largely geographic in nature, and each case demands a special study.

Some general rules followed in placing intakes are:

1. Avoid a position directly opposite the exit of a stream.
2. Place an intake in 30 or more feet of water.
3. Place an intake structure on solid rock and the intake tunnel within solid rock if possible.
4. Avoid a position affected by off-shore and on-shore winds.
5. Choose a sheltered bay where the water is 30 feet or more deep and where ice freezes to remain on the surface most of the winter.
6. Avoid proximity to sewer outfalls.
7. Avoid lanes of vessel passage.

There is no location in all the Great Lakes for a water intake to supply water entirely safe and economical without treatment of the water.

(The paper contains about 3300 words, and is illustrated with 13 maps, 3 pictures, 3 statistical tables, 2 diagrams, and 2 graphs.)

C. C. HUNTINGTON. (Introduced by Guy-Harold Smith.)

The Muskingum Watershed Conservancy District.

This is said to be the first example in America of cooperation for resource conservation by the Federal Government, a State, and the people of a Local Political Sub-division. The political district consists of eighteen Ohio counties, which include most of the drainage basin of the Muskingum River, about a fifth of the area of the State. Most of it is in the unglaciated section of the Allegheny Plateau.

The Conservancy District, created June 3, 1933, under the Ohio Conservancy Act passed soon after the great flood of 1913, includes approximately half the major land-use problem areas of the State. This very hilly section of Ohio was the first settled, but contains large areas not well adapted to arable farming, on account of the difficulty of using modern farm machinery and the serious erosion due to the rapid run-off from long denuded slopes and impoverished soils mostly of sandstone and shale origin.

The plan provides for fourteen reservoirs for flood control and water conservation. Controlling the waters of the Muskingum will also contribute to a lower flood crest on the Ohio below Marietta. So in reality this is part of a Mississippi River flood control project. It also will aid navigation on the Muskingum below Zanesville and on the Ohio by regulating stream flow.

The cost approximates $40,000,000, including the dams, one of concrete and thirteen of earth and rock construction with concrete spillways, which will create three dry reservoirs and eleven permanent lakes from 350 to 3,550 acres in size. The Federal Government is constructing these dams and relocating some 70 miles of railroads, approximately 80 miles of gas and oil pipe lines, and over 270 miles of telegraph, telephone, and electric lines. The State Highway Department is relocating 150 miles of highways, while the acquiring of the property and rights of way for the dams, reservoirs, levees and various public utility, road, and other relocations falls upon the property owners of the District, who are to receive flood control and other benefits. This amount is estimated at approximately $7,000,000. The number of pieces of property listed as benefited or damaged has already reached 32,000. All of three villages and parts of eleven others must be relocated or abandoned. Several thousand workmen have been employed on the project through most of 1935 and 1936. Construction is to be completed by June, 1938.

The District has three demonstration projects for the prevention of soil erosion, a large tree nursery of the Soil Conservation Service near Zanesville, and a big outdoor laboratory for hydrologic soil and water studies near Coshocton.

The project not only aims at flood control and water conservation, but also has for its ultimate goal soil conservation, reforestation, and recreation.

ELLSWORTH HUNTINGTON.

Season of Birth, and the Distribution of Civilization.

A recent investigation of millions of births in many countries shows that there are great variations from season to season. It is possible to divide these into those due to climatic conditions and those due to cultural conditions. When this separation is made, all countries display a uniform pattern in relation to the seasons and the weather. The fundamental seasonal swing

of human reproduction is the same as that of animals. The maximum number of births occurs in the late winter or early spring at such a time that the young have a maximum chance of survival.

Not only the number of births, but also people's vigor throughout life varies in harmony with the month of birth. Those born most closely in harmony with the fundamental animal rhythm live longer than others. They also are more nearly evenly divided according to sex, and they comprise a higher proportion of persons of unusual ability. The primary factor in determining these conditions seems to be the health of the parents at the time of conception. Heat exercises a very detrimental effect, as is especially evident in Japan. Except in one respect, the most favorable conditions for conception occur when the temperature rises to the optimum in the late spring or early summer. The exception is mental capacity. The conditions most favorable for the production of people of high mentality are slightly cooler than those which favor long life and vigor in other respects. Such conditions add a new and important factor to our interpretation of the distribution of civilization. They appear to show that the difference between conditions in countries such as India and Sweden are due in part to a handicap imposed upon children even before they are born, and lasting throughout life.

CHARLES E. KELLOGG. (Introduced by W. Elmer Ekblaw.)

Soil and the People.

Living bodies, including human beings, are products of their environment and genetic heritages which are, in turn, products of previous conditioning. Man lives in landscapes produced by climatic and geological forces and characterized by certain biological complexes. The sum total of these forces, physical and biological, is best expressed in the soil characteristics of the landscape. Although there are many possible combinations of these forces, and many soils, these can be grouped into a comparatively small number of great soil groups characterized by internal and external features of far-reaching significance to human welfare. These extreme differences in soil make possible and necessary great variations in men and civilization, giving color and interest to the world, but leading inevitably to fundamental conflicts.

Civilization depends upon cooperation among men and between men and Nature. The nomad lives off the soil as an exploiter but in agriculture man cooperates with Nature. Not only is the farmer required to use vastly different techniques on the various soils, but his home life, even his hours of work and play, must be arranged as the soil requires. Further, the social group as a whole must adapt itself to the soil requirements. Systems of transportation, public works for irrigation, drainage, or flood control, arrangements for land tenure, credit facilities, and even the common law de-

velop in response to these requirements different in the several great soil groups.

Aside from these adjustments the character of the food itself has a direct effect. The composition of the diet has a definite influence upon disease, health, and the physical formation of both animals and men. To a considerable extent man's food owes its nutritional value to the soil and the cultivator's care. Soils low in available calcium, phosphorus, iodine, iron, copper, or nitrogen produce plants low in these essential elements. The different races of men seem to have developed in somwhat restricted soil regions, each having particular characteristics. Those individuals who survived over a period of many generations, were those able to adjust themselves to an iodine shortage, a phosphorus shortage, an excess of common salt, or whatever local situation obtained. These adjustments called for others; and a distinct physique developed.

Race is a product of the landscape; though 'people' move, a race is rooted to the soil. The 'strong race' has come into physical and social equilibrium with the soil. It may extend itself to other soils but can only maintain its identity and control as long as it raises its military forces on its own soil. If this adjustment is weakened through a deterioration of its social ideals, as frequently occurs when powerful cities, with their city 'laws,' exploit the country, other, more adapted races, may rise to power.

HAROLD S. KEMP. (Introduced by Charles C. Colby.)

Spain: The Land and the War.

The present civil war in Spain is—to a much greater degree than the newspapers suggest—a matter of regional geography. According to different reports it has appeared variously as a class war, a war between peasant farmers and urban factory-workers, the revolt of the meseta against the coastal lowland, of the south against the north and of the Catholics against anti-Christ.

It is, in fact, all of these, each of the two armies representing a variety of factions. The distribution of these factions, and the motivating element of each is, in almost every case, related to the land. Spain is a country of infinite variety. Climate, relief, drainage and soil perversely combine in a multitude of ways to locate not only a great diversity of habitat types, but also madly scrambled juxtapositions of those types.

Thus it follows that the present political map of Spain is something of a picture-puzzle. Insurgents dominate scattered bits of the meseta but are equally strong in widely separated pockets of the peripheral lowland. The loyalists hold equally rich and important discontinuous portions of lowland and plateau. One side had its fountain-head in the great city, Barcelona; the other, in the southern metropolis, Seville; the two factions divide between them, on the other hand, the chain of important towns along the north coast.

This paper undertakes to shake the scattered pieces of this puzzle into their places and to establish the logic of their distribution. It will appear that, however strong the bonds that unite remote and dissimilar regions into two fiercely warring groups, most of the country comprises a third, equally scattered element of the Spanish people which can find in its share of the land no basis for sympathy with either of the contestants.

LESTER E. KLIMM.

Problems of Fuel Supply in the Irish Islands.

The islands of the west coast of Ireland are unforested and the people must depend very largely on peat (or turf) for fuel. In some, such as the Arans, there is no local supply and turf must be imported from the mainland. This leads to careful production of a variety of small exports in order to meet this pressing need. In addition, this largely barren limestone area preserves and uses dried cow-dung for fuel.

Other islands, such as Inishbofin, Inishturk, and Inishark have adequate local supplies of poor quality turf for the present. Each is, however, gradually stripping off its pasture for this purpose and must, some day, face both pasture and fuel shortage.

Tory Island is an example of one so poor in turf and pasture that, during good times, fuel is imported. In recent years, however, poor income from fisheries has revived the cutting up of island pastures for fuel to the point where an acute shortage of both land and turf is already felt. Substitutes such as coal or kerosene have been suggested, but would not be feasible because there is no source of income with which to purchase them. Some of the islands are faced with abandonment, soon, if there is no revival of fisheries and no other source of income with which to purchase fuel becomes available.

FRED B. KNIFFEN.

Rural Occupance Patterns of Louisiana.

Rural occupance patterns are considered with special reference to their place as one group in a series of forms diagnostic of Louisiana's culturogeographic regions. House types have been previously treated from this point of view.

An occupance pattern is regarded as an observable phenomenon, whose reality is apparent even to the non-critical observer. Measurable and definitive elements of the occupance pattern are spacing and orientation of individual establishments, and field and road patterns. The specific nature of the individual establishment or farmstead is not here considered, being reserved for later study.

Based on field work and map study the several types of rural occupance patterns of Louisiana are recognized and illustrated, and their distribution in the state delineated.

HANS KURATH. (Introduced by Preston E. James.)

The Linguistic Atlas of the United States and Canada.

Work on the Linguistic Atlas of the United States and Canada, a research project sponsored by the American Council of Learned Societies, was started in the summer of 1931. The field work in New England was completed in 1933. Field work in the South Atlantic States is now in progress and will probably be completed two years hence. More than half the material for the 750 speech maps of New England has been edited, and the drafting of the maps was initiated in the spring of 1936. A wide-meshed survey of the Great Lakes Region and the Ohio River Valley is being envisaged.

All the materials were recorded in the homes of the informants. In New England 220 communities will be represented, and an equal number in the South Atlantic States. In each community two informants are chosen, one of the old-fashioned type and one of the modern type; and in one out of ten communities a cultured informant is interviewed. Each informant is in a large measure representative of his community and social class, and each community is representative of a larger district.

Information is secured concerning more than 750 items of speech. When the variants are charted, regional differences, social or age differences, or both, are clearly brought out. The regional distribution of speech forms often agrees in a striking manner with areas of settlement. In New England the original colonies of Plymouth, of Massachusetts Bay, of Rhode Island, etc., frequently stand out as units, and in many instances eastern New England as a whole contrasts with western New England. In the South Atlantic States Chesapeake Bay, the Charleston area, and the mountain area form distinct speech provinces. In other items the present distribution of speech characteristics coincides with the major trade areas; in others, rural areas stand in contrast to urbanized areas. Lantern slides illustrate these points.

From the few illustrations given one clearly perceives that speech is a prominent feature of the cultural landscape, and that social and regional peculiarities of dialect, as well as social differences in speech, can be understood only if full information concerning the racial, social, political, and economic history is brought to bear upon the linguistic problems.

On the other hand it should be obvious that the findings of the dialect geographer will be of great significance to students of other phases of population history.

PRESTON E. JAMES.

New Maps of South America.

This paper consists of a display of five new manuscript maps of South America on the scale of 1 : 6,000,000 on which new data have been compiled as follows:

1. Surface configuration.
2. Natural vegetation.
3. Climates after Köppen.
4. Population (dot map).
5. Density of population.

W. L. G. JOERG.

The Geography of the Antarctic: The Advances of a Decade (1926–1936).

The paper attempts to present a summary of our knowledge of the Antarctic (within the limits of the natural region as defined by Otto Nordenskjöld) as advanced in the ten years since the revival of Antarctic exploration. After a brief review of the outlining of the continent in this period, in which about as much of its coast (one-third) has been revealed as during the entire previous history of Antarctic exploration, the paper discusses the advances made in the fields of geology, glaciology, climatology, and oceanography and the light that they shed on the relation of the Antarctic to the structure and physical regimen of the earth as a whole. In the field of human affairs brief consideration is given to the agriculture of the southern continents as influenced by Antarctic meteorological conditions, to the recent development and growth of Antarctic whaling, and to the question of political sovereignty.

H. M. LEPPARD.

The Water Gates of the Narrow Seas.

The zone of dense settlement extending from Central Europe westward into Britain is severed by the narrow waters of the North Sea and the English Channel in which lies the primary focus of oceanic trade. Shipping penetrates the seaboards concerned principally by way of a score of major estuaries, including those of the Seine, the Scheldt, the Elbe, the Thames, and the Tyne Rivers. Till about the middle of the 19th century those and other estuaries remained largely in a state of nature and in that condition became entirely inadequate for the expanding commercial needs of the period. The paper deals principally with the various methods of improvement employed in terms of the flow of rivers and the configuration of channels, bars and littoral drift, tidal flow and scour, and other natural conditions encountered.

O. M. MILLER.

Air-Mapping in Some Recent Polar Explorations.

The paper describes the principles applied to the making of reconnaissance maps from photographs taken on expeditions in the polar regions with special reference to the work done at the American Geographical Society

in connection with the Wilkins trans-Arctic flight of 1928, the Byrd Antarctic expedition of 1928–30, the Ellsworth trans-Antarctic expedition of 1935–36, the Louise A. Boyd Greenland expeditions of 1931–33, the Forbes Grenfell Labrador expeditions of 1931–32 and 1935, and the Wood Yukon expeditions of 1935 and 1936.

ROBERT S. PLATT.

Shots from a Traverse Across South America.

The purpose of this paper is to present in palatable form one section of a field report. The general project is one of reconnaissance touching the major regions of Latin America. This particular presentation deals with a traverse from the easternmost to the westernmost point of South America along the north coast of Brazil, up the Amazon from mouth to headwaters, and over the Andes. The presentation is narrowed further by selecting only three spots for detailed discussion from a total of thirty study sites along the route.

Observation along the traverse and at all study sites is focussed on fundamental aspects of the pattern of terrene occupance, human settlement attached most directly to resources of the earth. Inhabitants of the three places selected have one interest in common—that of fishing. This is not a dominant interest along the traverse route, but is an item of distinct significance and provides a relatively simple theme for brief discussion.

The first spot for close observation is on the coast of Ceará where jangada fishermen draw upon resources of the continental shelf. The second is at the confluence of the Rio Negro and the Rio Solimões, where settlers take advantage of special conditions for fishing at the confluence and elsewhere in the floodplain, to help supply the Manáos market. The third place is on the Rio Nanay, a small Amazonian tributary, west of Iquitos, where Indian inhabitants fish to supply part of their subsistence needs, and depend upon resources of the forest for skins and gums with which to trade.

Fishing is not presented here as a pattern by itself, but as fitting into a pattern, as one thread in a fabric. Many threads enter into the fabric and together form a pattern of human occupance in a natural background too complex for immediate complete analysis but worthy of continued effort to arrive at full geographic understanding.

THOS. C. POULTER. (Introduced by W. H. Hobbs.)

The Application of Seismic Methods in the Discovery of New Lands in the Antarctic.

By means of modern equipment seismic reflection methods are for the first time used satisfactorily in the ice fields of the polar regions.

A survey of the Bay of Whales region was made covering a radius of 15 miles, and one line of stations 80 miles west to Discovery Inlet, travelling

on skiis and transporting equipment by dog team. Then a plane was used, covering a radius of 25 miles and two lines of stations, one west to Discovery Inlet, and another line of stations from Little America south to Admiral Byrd's Advance Base. Still another series of Stations was occupied along the route of the tractor party on the Plateau of Marie Byrd Land.

It was these Seismic measurements that established the proof of the existence of an Island to the southeast of Little America—"Roosevelt Island" over one hundred miles north and south by thirty-five miles east and west and reaching an elevation of one thousand feet above sea-level, covered over with 400 to 1500 feet of ice and snow.

MALCOLM J. PROUDFOOT. (Introduced by Charles C. Colby.)

Intra-City Business Areas for the Principal Cities of the United States.

During the past year, in answer to numerous requests, work has been undertaken using 1933 business data for the cities of Chicago, Philadelphia, Cleveland, Atlanta, and Des Moines, in order to formulate a plan for the establishment of business areas for intra-city business analysis. Block-frontage volume of sales and number of stores data, based on individual schedules, were plotted on the maps of these cities. This revealed five outstanding types of retail structure: (1) the central business district; (2) the outlying business center; (3) the principal business thoroughfare; (4) the neighborhood business street; and (5) the isolated store cluster. The first two types of structure are characterized by large stores selling clothing, furniture, automobiles, and similar shopping goods, and drawing customers from wide areas; the third type is characterized by a mixture of large widely-spaced stores, catering to and almost entirely dependent on customers drawn from wide areas which are attracted from passing heavy mass and vehicular traffic; and the latter two types are characterized by small convenience goods stores selling groceries, meats, vegetables, and other every-day necessities, and drawing customers from within easy walking distances.

This plan proposes: (1) closely confined business areas for the central business district and the outlying business centers, based on an analysis of block-frontage volume of sales; (2) closely confined business areas for segments of principal business thoroughfares based on the volume of sales of individual stores and of street traffic density; and (3) large residentially homogeneous community business areas of combined census tracts to enclose the neighborhood business streets and isolated store clusters.

At some future date this Bureau hopes to publish intra-city business data for the principal cities and their contiguous urban areas. Probably the data published will consist of the number of stores and the volume of sales for principal business groups. When such intra-city business data are pro-

vided they will aid: the study of retail decentralization; the correlation of population and business data; the making of business forecasts; the shaping of programs of business expansion; the evaluation of local real estate for investment purposes; and the settlement of legal disputes arising from the sale or inheritance of local business property.

ERWIN RAISZ. (Introduced by Preston E. James.)

Charts Showing the History of Cartography.

Four time charts showing the history of cartography in a comprehensive way. Besides listing the outstanding men and their works, the charts show how cartography was stimulated by various inventions and discoveries and how the leadership in cartography shifted from nation to nation.

The fifth chart, showing the development of American cartography from 1750 to the present time, shows the development of Colonial cartography, emancipation of American cartography from English and French, domination and the development of the American type of map, the rise and decline of county atlases and the modern scientific trend. The part showing the development of official cartography demonstrates the work of Washington's surveyors, the organization of the early state surveys, the stimulus of the westward migration and the organization of the great federal surveys.

The object of these charts is to make geographers acquainted with the outstanding facts of historical cartography.

JOHN R. RANDALL. (Introduced by J. R. Whitaker.)

Settlement of the Great Clay Belt of Northern Ontario and Quebec.

The Great Clay Belt of Northern Ontario and Quebec lies entirely within the Laurentain Shield, approximately mid-way between Georgian Bay and James Bay, and is by far the largest contiguous area of glacial clays within the Shield. At present the Clay Belt is also one of the large areas of pioneer settlement in the Dominion.

There are two definite sections within the Clay Belt: a smaller southern one at the head of Lake Temiskaming; and a much larger northern one, in part set off from the former by a wedge of the rocky Shield. Although the two sections are actually connected in the east by a strip of clay soil, this link is entirely undeveloped. Thus, as far as settlement and agricultural activity go, these two sections are distinctly separated. The north-south provincial boundary of Ontario and Quebec likewise divides the Clay Belt, giving Ontario slightly more than half the total area.

Settlement first started in the late 1870's in the southern section on the Quebec side, following the completion of the railroad to Mattawa. Although considerable information about the northern section had been obtained as early as 1900, settlement there did not begin in earnest until 1913 when the

area was opened by the Canadian National Railway. The Quebec portion was the first occupied, settlement spreading from there into Ontario, but at a slower rate. About this same time, the Temiskaming and Northern Ontario Railway was finished from North Bay to Cochrane, thus connecting the two sections of the Clay Belt. At present the main highways roughly follow the rail lines, and secondary roads stretch out from these primary arteries. There is, then, a very definite relation between the distribution of the transportation lines and the occupied land, no farm being distant from either a road or a railroad.

The Clay Belt was originally opened on the basis that all land capable of cultivation should be so used, and also in the Quebec area as a means to relieve press of population in the St. Lawrence Valley. In part because of the latter reason and in part due to the difficulties of settling the land, the present population is predominantly French-Canadian. This is true of both the Quebec and Ontario sections.

Rate and methods of settlement are somewhat different in the two provinces. This has resulted primarily from a difference in physical elements and government policy. Other important factors influencing settlement are the forest industries and mining.

Future trends in occupancy, as indicated by the present situation, will depend largely on changes of government policy, the development of transportation lines, the type of settler, and on the condition of the forest and mineral industries.

Richard Joel Russell.

Lower Mississippi Valley Loess.

Loess is widely distributed over the surface of Louisiana and adjacent parts of Mississippi. Observations not only fail to support the hypothesis of aeolian origin, but conclusively disprove it. Loess is not a stratigraphic unit in the geological sense. It is not deposited in its present condition. Its position has no time-scale significance. It is the product of weathering and soil-forming processes acting on sedimentary deposits. Alluvial silt is particularly susceptible to alteration to loess. In Louisiana, every gradation occurs between Mississippi River floodplain and typical loess bluffs. Such loess as occurs in Louisiana is not in any significant way related to glaciation.

Carl Louis Stotz. (Introduced by Samuel Van Valkenburg.)

The Political-Geographical Problems of Turkey.

Although the Republic of Turkey is very much smaller than the Ottoman Empire of which is was a part, it has achieved through its geographical variety and unity a stability unknown in the days of the expansive Empire.

Sectionalism is reduced to a minimum by the physiographical alignment and by the ethnographic composition of the population which has been reduced in complexity to a point where today it presents but a minor problem.

The geographical-political problems of the Republic are concerned with the defense vulnerability in which problem the Italian island of Rhodes and the Straits play important parts. The problem of mineral and industrial resurce vulnerability is a great one in time of peace as well as in time of war. The minority problem while essentially solved by the migrations of the Greeks and Armenians is still present but concerns the Kurds and Laz, nomadic tribes of the eastern plateau lands.

The foreign relations of Turkey are better now than ever before in the history of the country. Like Holland and Denmark, Turkey is a weak country governing a vitally important trade route. The Island of Rhodes is a vulnerable spot which may serve to break the now friendly relations with Greece. The strip of Greek territory on the western boundary of Turkey in Thrace, through which runs the Turkish railroad, is another potentially vulnerable spot. Similarly, Bulgaria's desire for an outlet on the Aegean Sea at Dedi Agach which has been stimulated by the recent refortifying of the Straits broods evil for the future relations between the two countries.

H. Thompson Straw. (Introduced by K. C. McMurry.)

Battle Creek, Michigan: A Study in Urban Geography.

Battle Creek, a city of about 44,000 population, lies in southwestern Michigan. It is one of a line of manufacturing cities which stretches across the state from Detroit to Kalamazoo and, like many of the other of these cities, owes its early start to the presence of water power at its site.

The central part of the city lies in an east-west glacial drainage channel approximately three quarters of a mile in width which is at present occupied by an underfit stream, the Kalamazoo. Here are found the commercial core and most of the manufacturing sites. The college and the sanitarium of the city are located on the bluff north of the valley. Both the bluffs north and south are given over to residence areas.

Battle Creek has had three distinct stages of development. The first settlement of the city, based upon the water power of the Kalamazoo River and its confluent the Battle Creek, was in 1831. The pioneer industries then established processed local raw materials such as grain and lumber. The coming of the railroad in 1845 brought the second stage of development to the city. With the railroad came outside competition which the pioneer industries could not withstand. With the decline of these industries other manufacturing of a miscellaneous character grew up. The products were numerous, mostly made from iron and other metals, and the majority

such as farm implements and tools were intended for the then growing near-by rural market. The third and last stage was the result of the cultural heritage of the Seventh-Day Adventists. Among their religious concepts was the belief in the harmfulness of certain foods and the beneficial qualities of certain others, particularly cereals. This idea was first commercialized by C. W. Post and later by many others.

The amount of advertising done by the cereal companies and by the sanitarium often obscures the fact that these do not embody all the functions of the city. Indeed the cereal companies do not constitute all of the manufacturing. Those companies which remain from the second stage of development occupy a larger area than the more recent cereal-processing industries and employ nearly as many persons. Another function is represented by the commercial core. This core, although outranked both in area and in the number of persons employed by the industries of the city, in turn outranks both the college and the sanitarium in importance. Besides serving its primary trade area it is the retail shopping center for approximately 1,100 square miles and 110,000 population.

C. W. THORNTHWAITE.

The Life History of Rainstorms in Oklahoma.

Published in full in the GEOGRAPHICAL REVIEW, January, 1937.

GLENN T. TREWARTHA.

Field Observations on the Canton Delta.

The Canton Delta is archipelagic in character with two levels of hard-rock hills rising above the frequently inundated new alluvium. The lower story of hills is composed chiefly of weak shales and sandstones, while the higher ones are of granite and quartzite. Just as completeness of utilization characterizes the new alluvium so incompleteness characterizes the delta's hills. Other than waste land, vegetable and fruit crops, together with grave lands occupy significant parts of the uplands. Mulberry, which in Japan is almost exclusively a dry-site crop, is rarely found on the hills in the Canton region.

Noteworthy as one of the four nodes of specialized sericulture in China, the Canton Delta stands apart from the other three nodes in certain respects. In the first place both its silk worms and its mulberry are closely allied to tropical varieties. As a consequence more broods of worms and more mulberry leaf can be produced in a season than is possible farther north. Throughout the specialized silk area of the Canton Delta a unique land system known as the "6-land 4-water" system prevails. In order to elevate the mulberry plot above flood water a pit is excavated and the earth taken from it is spread over approximately six parts of the field. The remaining

four parts, or the pit, become a pond in which fish are raised. Thus the growing of fish and the raising of mulberry are complementary parts of the standard system.

SAMUEL VAN VALKENBURG AND MARGARET QUIMBY. (Introduced by Samuel Van Valkenburg.)

Eupen-Malmedy: A Study in Political Geography.

These two districts, together 1,000 square kilometers, have a population of 63,000 persons. They were given to Belgium after the World War. A political-geographical study of this region includes the following units: (1) A geographical description (including the ethnographic structure), (2) The historical background, (3) The shift after the World War and the reasons for it, (4) The economic consequence of the shift, (5) The human side of the new political arrangement, and finally, (6) An evaluation of the present conditions together with a forecast of what may happen in the future.

J. O. VEATCH.

The Geographic Significance of the Soil Type.

The soil takes on a practical significance for the geographer only when it is divided into its ***kinds*** and further only when those ***kinds*** are delineated on maps. The larger groups of soils are mainly of academic interest; and the geographer must deal with the smaller units of the classification, if his studies are to have much practical bearing upon land-use problems. The principal source of detailed soil maps in the United States is the Soil Survey reports of the U. S. Department of Agriculture. The unit of mapping in the one-inch or two-inch to the mile scale of mapping is designated as a "type." If the geographer develops a sympathetic understanding, since there are inconsistencies and errors, and makes a proper interpretation of the soil maps, he will find them of great value: (1) as a basis for evaluating land and in making land inventory maps; (2) as a means for explaining the land use pattern and predicting changes in that pattern; (3) in the new field of rural land planning and soil conservation; (4) in the delineation of natural land divisions.

The fourth use is considered the most important one. The geographer can construct his own natural land divisions, to which he can tie, or by means of which he can correlate, his field studies. The soil would be an important component of the natural geographic division of land.

STEPHEN S. VISHER.

Regional Contrasts in Rainfall Intensity in Indiana with Some Consequences of the Contrasts.

Annual averages give a very inadequate picture of rainfall conditions.

The more that rainfall data are studied, the more evident becomes the need for an analysis of rainfall distribution for shorter units of time than the year, the season, or even than the month.

Rainfalls for short periods (hours and days) have been studied for Indiana in considerable detail in an effort to discover the climatic contrasts in the State, and to aid in the evaluation of the climatic factor. Moreover, as Indiana is a representative State in various respects, detailed studies of its rainfall intensity should be of service in wider areas.

Scores of maps have been prepared concerning various aspects of rainfall intensity. Some of these are of the annual and seasonal frequency of monthly totals of five and ten inches of rainfall. Another series shows the number of days for each of the months having rainfalls of one inch a day or two inches in two consecutive days. Another series gives the amounts of rainfall received in the greatest rainstorms of one day, of three consecutive days, and of six days, for the median year of record, for the wettest one-fifth of the years, for the wettest one-tenth of the years, and for the least rainy one-tenth. Six maps give the record maximum rain falling in one day, in two consecutive days, in 3, 4, 5, and 6. Twenty maps give the percentages of the years that have had rainfalls of certain amounts, for example, two, three, or five inches in one day, of two, three, or five inches in two consecutive days, of three, five, six inches in 3 days, of 4, 5 or 6 inches in 4 days, of 5 or 7 inches in 5 days, of 6 in 6, of 8 in 6, of 10 inches in 6 days. An eighth series, of 24 maps, gives the monthly and seasonal distribution of rains of one inch a day, two inches in two days, and of the maximum 1 day, 2 day, 3 day and 6 day rainstorms. Seven maps give the number of excessive short period (less than a day) rains by seasons. The final series gives the record precipitation in storms of less than a day's length.

Most of these series are based upon from 40 to 90 weather bureau stations, and a record of from 30 to 45 years. They practically all show a very notable southward increase in rainfall intensity. Whereas southern Indiana receives in a year less than fifty per cent more rainfall than does northern Indiana, southern Indiana has several to many times as many rainstorms of the various intensities studied, especially in the cooler months, when run-off is greatest.

Apparently correlated with the regional contrasts in rainfall distribution and intensity are notable contrasts in the type and extent of soil erosion, in topography, in crop yields, in agricultural practices, and in land use of other sorts, and in other respects.

In brief the conspicuous differences between northern and southern Indiana are clearly partly due to contrasts in the precipitation time distribution. The more numerous and heavier downpours of rain in southern Indi-

ana help explain why southern Indiana has on the average more rugged topography, thinner and poorer soils, smaller crop yields, more land abandonment, and fewer progressive people, than has northern Indiana.

DERWENT WHITTLESEY.

Kano.

The accepted uniformity of environment in the Sudan is challenged by sharp diversity of population density. No spot of dense population is more striking than Kano and its umland, prominent for a millennium as an economic focus, and preeminent for a century, although never favored by politics. The city is rooted in its surrounding countryside, where natural conditions combine to favor agriculture. Crafts, chiefly iron, leather, and cotton, have profited from local raw materials and from a market both in the nearby farmlands and afield—extending at one time from the Mediterranean to the Guinea shores.

Its site on a defense point and its location on routes of trade fixed by nature, contributed to the city's stability and growth in the centuries before Europeans came.

The functional forms of the city today are basically West African, although interspersed with European features. Two stages of occupance are well enough known to picture: the present, and that which held sway during the 19th century.

A large part of the paper is devoted to the geographic structure of these two stages—Hausa-Fulani Kano and Hausa-Fulani-British Kano.

SIR HUBERT WILKINS. (Introduced by W. H. Hobbs.)

Some Polar Problems and the Method by which They May be Solved.

There are two major geographical polar problems which should be solved before the setting up of an international bureau to inaugurate and carry on sustained observations. One of these has to do with the area that lies between the Ross and Weddell Seas. Does there exist a below sea level connection? This problem is still be to solved, for the recently acquired evidence of Byrd and Ellsworth is not conclusive.

Practically nothing has been seen of the area of about 250,000 square miles lying between longitudes 110–150 W. and latitude 80–87 N. There is within this unknown area room for an island as large as the British Isles combined. The positive evidence which favors land here is given.

LEONARD S. WILSON. (Introduced by K. C. McMurry.)

Cooperative: A Kentucky Mining Community.

Representative of settlement and economy in the mining portion of the Northwest Cumberland Plateau, the small village of Cooperative is located

in southeastern Kentucky. A unit of the Stearns Coal and Lumber Company, it may be considered as characteristic of the villages distributed over an area of more than 1,000 square miles controlled by this company.

Cooperative is located in the western margin of the maturely eroded Cumberland Plateau. In this section the Plateau is capped by a coarse-grained resistant conglomerate which has retarded the normal cycle of erosion. Flat topped interfluves are separated from the more mature valley bottoms by vertical cliffs, in places more than 300 feet high. Vegetation and soils are distributed with reference to the surface configuration.

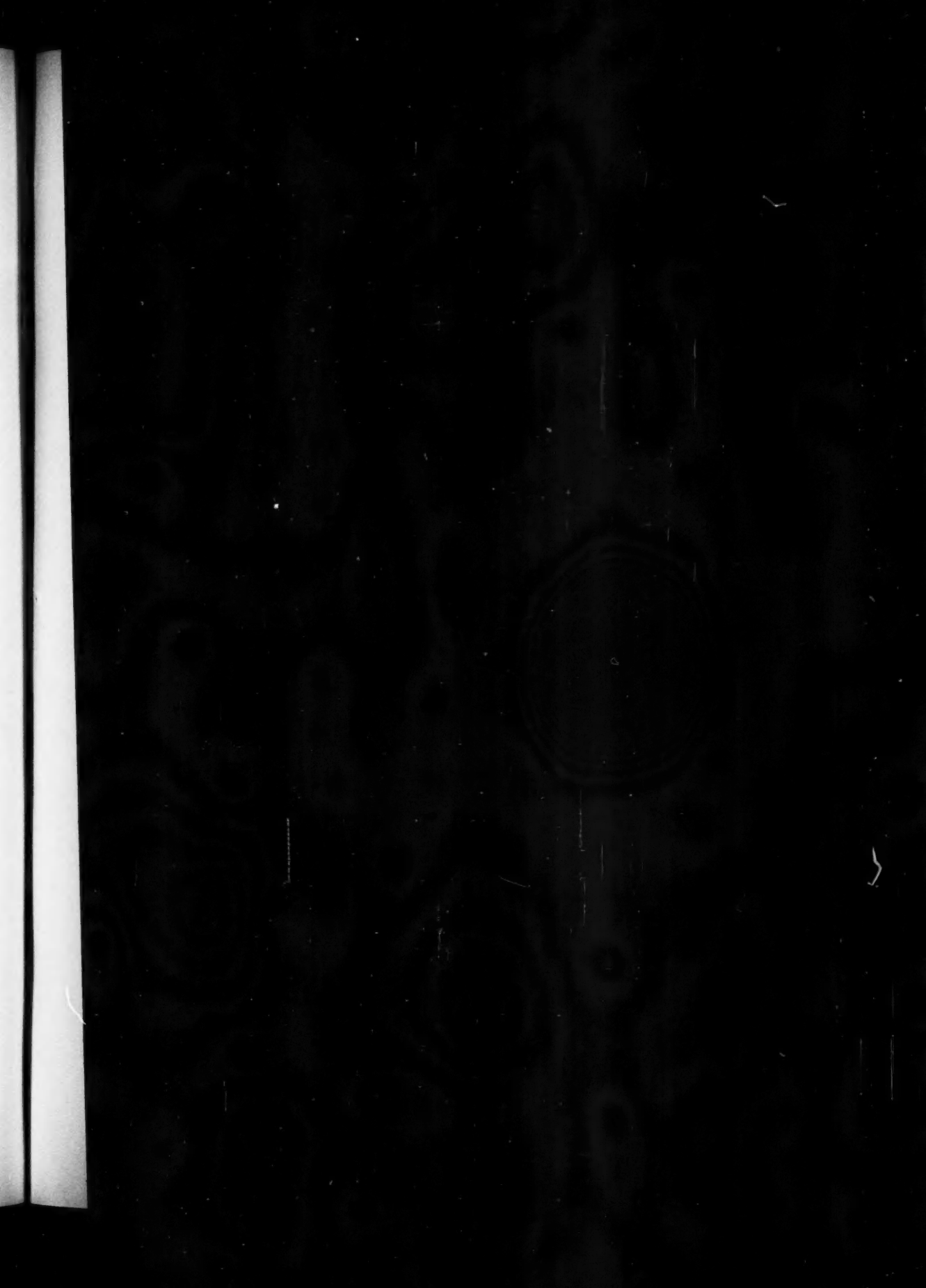
Although this area has been settled for more than a century, recent developments of transportation within the area and industry without the area, have modified population distribution to a marked degree. This movement has been most noticeable in the areas of commercial mining.

Settled in 1923 when rail communication with the main line of the Southern Railroad was established, Cooperative has reflected the established customs of large scale mining operations, in that the entire settlement was constructed by the Stearns Company.

Following the building of the community, workers were attracted from nearby valleys by comparatively high wages and greatly improved living conditions. Additional incentive to work at Cooperative was the introduction of mining on a share basis. The plan operated successfully until 1930 when, because of the decreased demand for bituminous coal, the company was forced to repurchase the outstanding stock. This same decline in coal consumption resulted in a reduction of the working hours and consequently in the wages of the workers. Part time agriculture and pasturing has enabled the miners and their families to remain in their homes.

It is the writer's purpose to describe, in detail, the sequent occupance of the community, as well as to interpret and describe the present day Natural and Cultural Landscapes of this single community which is representative of the larger region controlled by the Stearns' interests.

JOHN K. WRIGHT.

Measuring the Evenness of Distributions.

Two fundamental characteristics of the distribution of a given number of objects (such as people) within a given region are (1) density, and (2) evenness, or its opposite "lumpiness" (*i.e.*, partial or complete concentration). Techniques for determining the degree of evenness of distributions are suggested in this paper and examples are presented. Two coefficients have been developed. One shows the degree of "lumpiness" irrespective of the relative position of the "lumps." The other takes the relative positions of the "lumps" into consideration.